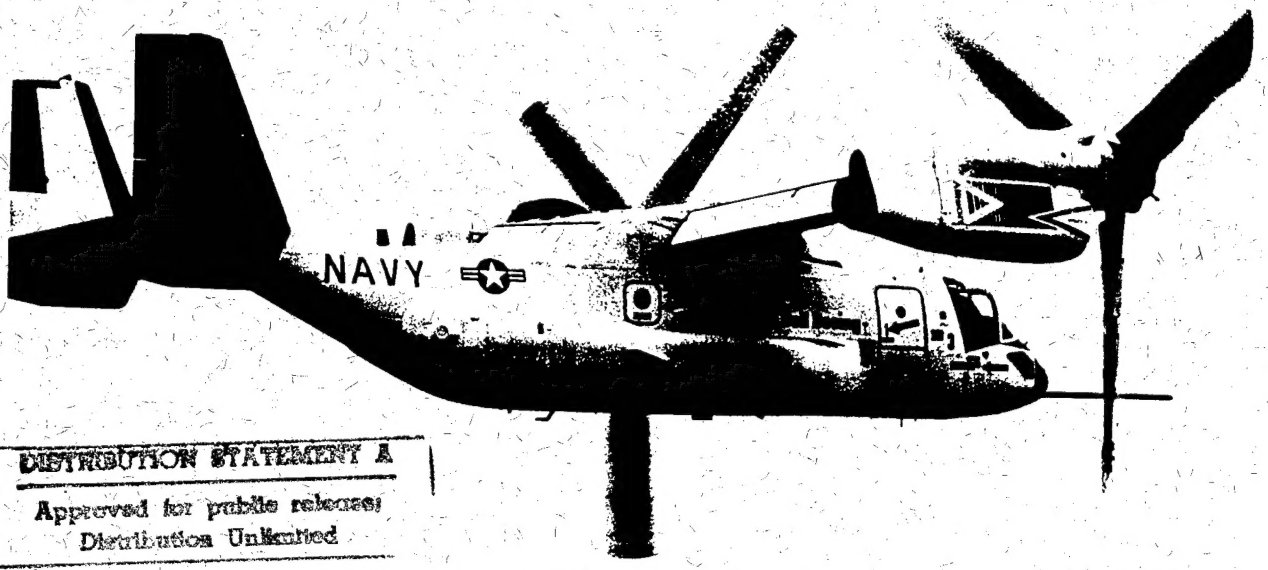
Final

ENVIRONMENTAL ASSESSMENT

Test and Evaluation of the V-22 Osprey at NAWC AD Patuxent River, Maryland



DEPARTMENT OF THE NAVY
NAVAL AIR WARFARE CENTER AIRCRAFT DIVISION
PATUXENT RIVER, MARYLAND

August 1995

DEPARTMENT OF THE NAVY
OFFICE OF THE CHIEF OF NAVAL OPERATIONS
2000 NAVY PENTAGON
WASHINGTON, D.C. 20350-2000

IN REPLY REFER TO

5090
Ser N456F/5U598483

From: Chief of Naval Operations
To: Program Executive Office, Air; ASW Assault and Special Mission Program (PMA-275)

Subj: FINDING OF NO SIGNIFICANT IMPACT FOR TEST AND EVALUATION OF THE V-22 OSPREY AT NAVAL AIR WARFARE CENTER AIRCRAFT DIVISION PATUXENT RIVER, MARYLAND

Ref: (a) PEO-A ltr 5090.Ser PMA-275G/4942 of 29 Sep 95
(b) OPNAVINST 5090.1B

Encl: (1) Finding Of No Significant Impact (FONSI)

1. An Environmental Assessment (EA) for the subject action was forwarded by reference (a) for review in accordance with reference (b). It has been determined that preparation of an Environmental Impact Statement (EIS) is not required. Accordingly, it is considered that, with implementation of the following paragraph and any mitigation measures described in enclosure (1), compliance with the National Environmental Policy Act has been effected and, in this regard, the project may be initiated.

2. The Council on Environmental Quality regulations require public notification of the decision not to prepare an EIS and the availability of the EA be published locally. Enclosure (1) is provided for your use in implementing this requirement and should be published in local newspapers. Enclosure (1) should also be mailed to any interested parties. Please provide verification of local publication to CNO (N456) upon implementation. The EA should be retained in project files for possible future use.

3. Questions regarding this FONSI may be directed to Mr. Thomas Peeling (N456), Special Assistant for Environmental Planning, Office of the Chief of Naval Operations at (703) 602-4320 x321.

R. L. STEINBRUGGE
By direction

Copy to:
ASSTSECNAV (RDA) ABM
DEPASSTSECNAV (ES, IF)
AIR-8.0Y (R. Olsen)
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CHINFO

DEPARTMENT OF DEFENSE
DEPARTMENT OF THE NAVY

FINDING OF NO SIGNIFICANT IMPACT FOR TEST AND EVALUATION OF THE V-22 OSPREY AT NAVAL AIR WARFARE CENTER AIRCRAFT DIVISION PATUXENT RIVER, MARYLAND

Pursuant to Council on Environmental Quality regulations (40 CFR Parts 1500-1508) implementing the procedural provisions of the National Environmental Policy Act, the Department of the Navy gives notice that an Environmental Assessment (EA) has been prepared and that an Environmental Impact Statement is not being prepared for test and evaluation of a low rate initial production of V-22 Osprey aircraft at Naval Air Warfare Center Aircraft Division (NAWC AD) Patuxent River, Maryland.

The proposed action is to test and evaluate several initial production Vertical/Short Takeoff and Landing (Tilt Rotor) aircraft, the V-22 Osprey, during the Engineering and Manufacturing Development (EMD) and Low Rate Initial Production (LRIP) phases. The current EA addresses potential environmental impacts associated with site-specific impacts at NAWC AD Patuxent River during EMD and LRIP phases of the V-22 program. Three versions of the V-22 Osprey aircraft are proposed to be tested at NAWC AD Patuxent River: four MV-22 (Marine Corps version); one CV-22 (Special Operations Command version); and two HV-22 (Navy version). Flight tests are proposed to occur within restricted flight areas controlled by NAWC AD Patuxent River. The test program has a goal of 20 flight hours per month with an average 1.5 hours per flight. Ground testing will occur close to existing aircraft hangers and near an abandoned taxiway. A ground-run stand will be constructed in this previously disturbed area to accommodate V-22 ground testing. A 5,000 square feet V-22 Aircraft Electronic System Test Laboratory (VESTL) will be constructed 60 feet southwest of the existing V-22 hanger (Building 109) to monitor and evaluate the ground tests. These phases of the program are scheduled to be completed by the year 2004 and will involve, during peak testing/support years (1997-2000), approximately 450 persons yearly. Personnel associated with the EMD and LRIP phases will be military, civilian-government, private industry (Bell-Boeing), and support contractors.

The purpose for the tests is to evaluate and ensure that V-22 aircraft can meet the specified mission requirements. The development and production of the V-22 is needed to meet the current shortfall in the medium lift force and correct inadequacies in quality/capability of the existing medium lift force within the Services. A second alternative considered performing the EMD/LRIP tests at Edwards Airforce Base, California; however, almost all program personnel would have to

relocate to the base, costs and efforts associated with this alternative would be extensive, and environmental concerns (primarily air and water quality issues) made further consideration of this alternative unreasonable. The "No Action" alternative would allow no further testing of the V-22 at NAWC AD Patuxent River, the V-22 program could not move forward and production of the aircraft could not continue.

The proposed action is consistent with the mission of NAWC AD Patuxent River and will have a minimal impact on current operations. Air quality in St. Mary's County, Maryland is in attainment for all criteria air pollutants. Neighboring Calvert and Charles Counties are in non-attainment for ozone. Analysis of total air pollutant emissions resulting from the proposed action (including commuter vehicle emissions) demonstrated that potential emissions would be below *de minimis* levels. Potential emissions of ozone precursors in Calvert and Charles Counties would, therefore, be clearly below *de minimis* levels. No significant impacts to automobile traffic patterns are expected to occur.

Noise generated by the proposed action would represent a minimal increase over current levels and impacts will not be significant. Means of mitigating potentially adverse impacts to threatened and endangered species has been coordinated with the U.S. Fish and Wildlife Service and incorporated into the proposed action. V-22 flight tests will maintain a minimum distance of 1,320 feet (1/4 mile) from specified active bald eagle nests to avoid disturbance. Also, specified locations where the northern tiger beetle and puritan tiger beetle occur will be avoided. NAWC AD Patuxent River has practices in place that minimize potential wildlife and migratory bird impacts. The proposed action will not substantially affect these practices. No jurisdictional wetland areas are near the sites selected for construction of the VESTL or ground-run stand, consequently, no impacts are expected.

The proposed action will not impact any archeological, cultural, or historic resources listed or determined eligible for listing on the National Register of Historic Places. The proposed action will not cause an adverse human or environmental impact to any minority or low-income population. No significant impacts to existing utilities or services, hazardous materials or waste programs, or contaminated soils are anticipated.

Based on the information gathered during preparation of the EA, the Navy finds that the proposed test and evaluation of a low rate initial production of V-22 Osprey aircraft at Naval Air Warfare Center Aircraft Division (NAWC AD) Patuxent River, Maryland will not significantly impact the environment.

The EA addressing this action may be obtained from: Commanding Officer, NAWC AD Patuxent River, Mail Stop 1, Building 3159, 22623 Cedar Point Road, Patuxent River, MD 20670-5304 (Attn: Ms. Jill Cicierski, Code 8.1000A). A limited number of copies of the EA are available to fill single copy requests.

5 October 1995
Date

Thomas J. Peeling
Special Assistant for Environmental Planning
Environmental Protection, Safety and
Occupational Health Division
Deputy Chief of Naval Operations (Logistics)

FINAL

ENVIRONMENTAL ASSESSMENT

V-22 OSPREY

TEST AND EVALUATION

NAVAL AIR WARFARE CENTER, AIRCRAFT DIVISION
PATUXENT RIVER, MARYLAND

RESPONSIBLE OFFICIAL:

Captain E.L. Standridge
U.S. Navy
Naval Air Station
Patuxent River, MD 20670-5409

E L Standridge
Signature

R.D. Garner
Colonel, USMC
V-22 Program Manager, (PMA-275)

R D Garner
Signature

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August 1995

CHANGE NOTICE

Final EA
Test & Evaluation of the V-22 Osprey
at
Naval Air Warfare Center, Patuxent River, MD.

1. The following changes apply to the Final Environmental Assessment (EA) for the Test and Evaluation of the V-22 Osprey at Naval Air Warfare Center, Patuxent River, Maryland:

a. Page 1-3, 5th paragraph, 6th sentence. Change sentence to read, "Aircraft #2 returned in July 1995, and is kept in storage."

b. Page 1-3, last paragraph, 2nd sentence. Change sentence to read, "This phase involves producing and testing four aircraft which incorporate corrective actions to FSD deficiencies, and weight and cost reduction programs."

c. Page 1-4, paragraph titled "*Production*", is changed as follows:

1. Move all text and insert as a separate paragraph between the 1st and 2nd paragraphs of the "*Engineering and Manufacturing Development*" section beginning on page 1-3.

2. Insert following text into the "*Production*" paragraph: "Presently 494 production V-22s are planned. Full rate production is scheduled to begin in 2001."

d. Page 1-4, paragraph titled "*Low Rate Initial Production*", is changed as follows:

1. Change first sentence to read as follows: "This phase involves manufacturing 24 production V-22s to conduct Follow On Test and Evaluation and initial MV-22 fleet and squadron standup.

2. Move the 2nd and 3rd sentences, "Aircraft #11 ...Chapter 2." to the end of the 2nd paragraph, "Tests to be ...Chapter 2." of the "*Engineering and Manufacturing Development*" section beginning on page 1-3.

Enclosure (2)

RECORD OF NON-APPLICABILITY
CONFORMITY ANALYSIS
FOR TEST AND EVALUATION OF THE V-22 OSPREY
NAVAL AIR WARFARE CENTER -AIRCRAFT DIVISION
PATUXENT RIVER, MARYLAND

1. A Conformity Determination is required for any Federal action that may contribute to an increase, above certain de minimis thresholds, in a criteria pollutant within a designated non-attainment area (NAA). St. Mary's County is in attainment for all criteria pollutants; however, neighboring counties, Charles and Calvert, are within a serious NAA for ozone.

2. Emissions for the proposed action are identified in appendix A of the V-22 Environmental Assessment (EA). The analysis prepared in the Environmental Assessment looked at the emissions for the entire proposed act and found those emissions to be below de minimis levels. Using values from the CEQA Air Quality Handbook (CA SCAQMD, 1992), projected construction emissions are 0.53 tpy for SOx, 2 tpy for CO, 4.7 tpy for NOx, 0.4 tpy for VOC and 0.5 tpy for PM10. These emissions are well below de minimis levels.

3. Emissions in St. Mary's County from the V-22 operations, ground testing and relocation of personnel are also included in appendix A of the V-22 EA. Projected emissions for the proposed action are 0.24 for SOx, 20 tpy for CO, 4.3 for NOx, 10.6 tpy for VOC and 7 tpy for PM10. These emissions are well below de minimis levels. Projected emissions from commuter traffic and V-22 operations in Charles and Calvert County are much lower and therefore result in de minimis levels.

4. I have reviewed the air emissions analysis portion of the V-22 Environmental Assessment (EA) and to the best of my understanding and knowledge the information contained within is true and accurate. The analysis shows that a Conformity Determination for the V-22 actions at the Naval Air Warfare Center -Aircraft Division, Patuxent River, Maryland is not applicable.

R. A. KECHTER
Captain, CEC, U.S. Navy
Public Works Officer
By direction of
the Commanding Officer

EXECUTIVE SUMMARY

EXECUTIVE SUMMARY

The United States Navy (USN) plans to test and evaluate a low rate initial production of V-22 Osprey aircraft. A programmatic environmental analysis for the V-22 program was prepared for all life-cycle phases of the V-22 Osprey, and provides background documentation for this site- and phase-specific environmental assessment (EA). This EA analyzes the Navy's proposal to conduct testing of the aircraft during the Engineering and Manufacturing Development (EMD) and Low Rate Initial Production (LRIP) phases at the Naval Air Warfare Center Aircraft Division (NAWC AD) Patuxent River, located at the Naval Air Station (NAS) Patuxent River, Maryland.

The purpose of the V-22 program is to provide an aircraft to meet the medium lift amphibious/vertical assault needs of the United States Marine Corps (USMC), the search and rescue needs of the USN, and the special operations needs of the United States Special Operations Command. The need to pursue the V-22 program is based on a response to the change in America's national security policy. The focus for the U.S. military has shifted from a major cold war confrontation to one of expeditionary power projection. For the USN, a cold war, open ocean, blue water strategy has shifted to power projection in a regional and littoral environment. The V-22 must not only meet conventional threats, but must be fully capable of conducting worldwide operations in unconventional and contingency combat.

The current fleet has several shortfalls in the medium lift force, which severely limits the USMC assault support mission. The shortfalls are an inadequate number of airframes; inadequate payload, range, and speed; inadequate capability to communicate, navigate, and operate in adverse weather conditions by day or night; no self-deploy or aerial refuel capabilities; inadequate capability to operate in a nuclear, biological or chemical environment; inadequate threat detection and self-protection; unacceptably high maintenance and inspection tasks; and inadequate combat survivability and crashworthiness.

The action is the test and evaluation of the V-22 through the EMD and LRIP phases. The EMD test phase currently uses a previously manufactured V-22 aircraft (number 3) from the preceding Full Scale Development (FSD) contract to conduct an EMD risk reduction flight program. Four aircraft (MV-22) will be produced for the U.S. Marine Corps under the EMD contract. These aircraft are numbered 7 through 10. The EMD contract will be modified in 1995 to add a Special Operations Command (SOCOM) aircraft (a CV-22, aircraft number 11). The LRIP would continue with the Follow-on Test and Evaluation (FOT&E) of initial production aircraft (MV-22 versions) at the Marine Corps Air Facility, Quantico, Virginia. The remaining EMD and LRIP testing would be performed from 1995 through 2000.

The projected flight test missions would be flown within local tower traffic patterns and restricted areas currently used by NAWC AD Patuxent River. The V-22 may be flown out of these areas (e.g., to Quantico), but test missions would not be conducted out of the restricted areas.

The V-22 aircraft are currently sheltered in Hangar 109 and are flown and maintained by an Integrated Test Team (ITT), a joint venture between government and contractor personnel. The ITT would use the Navy's concept of three levels of maintenance—organizational, intermediate, and depot maintenance. Organizational maintenance would include the day-to-day support operations. Generally, intermediate maintenance would include only minor maintenance and parts changes at the NAWC AD Patuxent River.

To support the V-22 program, an aircraft ground run stand is scheduled to be constructed within the bounds of the airfield. A facility for the V-22 Aircraft Electronic System Test Laboratory (VESTL) is programmed for construction near Hangar 109. The number of personnel needed to support the V-22 program varies, with an estimated maximum of 461 additional personnel in 1997.

The use of alternative locations to conduct testing of the V-22 was considered, but eliminated from further evaluation. The best alternative test location would be Edwards Air Force Base (AFB), California. Edwards AFB conducts flight testing for the Air Force, and currently has most test equipment and facilities needed to test the V-22. Relocation to Edwards AFB would involve some modification of the host facilities, and construction of a ground run stand specifically for use with the V-22. The numbers of personnel assigned to Edwards AFB and support activities would increase at Edwards AFB as a result of the V-22 program. About 150 to 300 personnel, primarily contractor personnel, would be moved to Edwards AFB during the test and evaluation period.

The effort and costs of establishing a V-22 test team and facilities at Edwards AFB would be extensive, and would have an associated schedule risk. Adverse environmental impacts from relocating the V-22 test program to Edwards AFB are also likely to occur in the areas of air quality and water resources. Therefore, the use of Edwards AFB as an alternative location for the V-22 testing is not a reasonable alternative, and was not further evaluated in the assessment.

The no action alternative constitutes no further tests of the V-22 at NAWC AD Patuxent River. Under this alternative, no additional aircraft would be acquired, and aircraft #3 would not be tested further under the ITT concept. The basic V-22 would be unserviceable without the tests, and production of the aircraft could not continue.

The impacts of the V-22 program would be cumulative with other present and reasonably foreseeable future actions. Ongoing construction includes facilities to support the relocation of additional major research/engineering functions to

NAWC AD, Patuxent River as directed under the 1991 decisions of the Commission on Base Realignment and Closure (BRAC). Another realignment of the NAWC AD Patuxent River is planned and is the subject of an environmental impact statement. The action, as required by the 1993 BRAC Commission, involves relocation of Navy personnel and activities to NAWC AD Patuxent River. Construction would occur from 1995 through 1997 and projects include: NAVAIR Headquarters, a propulsion system evaluation facility, and expansion of the child development center, widening of Buse Road, and a fuel pipeline extension. A follow-on test program for the T-45A aircraft is planned for the NAWC AD Patuxent River. No significant cumulative impacts of current and projected actions are likely to occur.

The following areas of concern have been identified during evaluation of the affected environment. For these resource areas, potential environmental consequences associated with the preferred action and the no action alternative were evaluated, and possible mitigation measures, where applicable, were suggested.

1 Aircraft Operations and Safety.

Under the proposed action, aircraft operations would peak during 1997 to 1998. The proportion of V-22 operations to NAWC AD Patuxent River operations is minimal (approximately 1 percent), and would change negligibly regardless of whether the total installation operations continue to decrease, or remain constant or increase. Consequently, the peak operational level would not impact operations, airspace use, and flight safety. Under the no action alternative, no V-22 operations would occur. If other aircraft were to be upgraded and tested, the potential for operational and safety impacts would increase, but would be similar to those of the V-22 program.

2 Air Resources.

Air quality impacts would occur as a result of construction (e.g., grading for the ground run stand and pavement removal and excavation for the VESTL building) and operational (e.g., flight, downwash testing, refueling) activities associated with the proposed action, but would not be significant. Construction-related impacts would occur intermittently over a period of about four months. Operational impacts would also be intermittent, but would be long-term. V-22 flight operations and ground testing would cause a net increase in total criteria pollutant emissions of approximately 23 tons per year. Additional sources of emissions, mostly from mobile sources, would raise the amount of V-22 related emissions to about 27 tons, or nine percent of the total baseline emissions. Discontinuation of the V-22 program under the no action alternative would result in no impact to air quality. If a replacement program was implemented instead of testing the V-22, impacts similar to the proposed action would occur.

3 Biological Resources.

The analysis of the proposed action indicates that impacts to vegetation and wildlife would be insignificant from construction activities for the ground run stand and VESTL building, and from aircraft and facility operations. However, significant impacts to biological resources (i.e., threatened or endangered species) could occur, but these impacts could be mitigated. Areas that contain threatened or endangered species (e.g., sandy beaches that support the least tern and northern beach tiger beetle and earthen cliff faces that support the puritan tiger beetle species) must be avoided during V-22 operations. The site selection for landing the aircraft (other than established or paved areas) would need to be coordinated with the Natural Resources office; a database of State-listed plant species at NAS Patuxent River needs to be consulted to ensure landings do not disturb the plants. Other specific areas (e.g., Bloodsworth Island) must be avoided during waterfowl migratory and overwintering periods. These locations and dates are available through the operations office. Bald eagle nest sites must be avoided during the nesting season, from December through June. There are currently three bald eagle nests in very close proximity (1 to 3 miles) to NAS Patuxent River. Other nests occur within the NAS Patuxent River operating areas. Identifying nest sites within these areas will require coordination with both the Maryland Department of Natural Resources and the Virginia Department of Game and Inland Fisheries. Avoiding nest sites by a minimum distance of 1,320 feet is recommended, to avoid disturbing nesting eagles. Under the no action alternative, no impacts to biological resources would occur if no replacement aircraft were tested. If other aircraft were upgraded as replacements for the V-22, similar impacts to the proposed action would occur, and similar mitigative measures would be required.

4 Cultural Resources.

Construction of the ground run stand would occur in an area of the flightline previously disturbed during grading for the runway. Construction of the VESTL building would disturb previously developed land. Based on surveys conducted by the Navy, no archeological or other cultural resources are known to occur in these areas. The depth of construction for the ground run stand would be similar to the depth for runway preparation, and for the VESTL building would be several feet. Because it is unlikely that cultural resources would be disturbed during construction, no impacts are predicted. There have been no known visual or audible effects to historic resources from aircraft flights at NAS Patuxent River. The noise generated by NAWC AD Patuxent River aircraft is insufficient to damage historical properties. No impact is predicted for the no action alternative. If another program were introduced and construction was proposed, potential impacts to archeological resources would need to be reevaluated.

5 Hazardous Materials and Wastes.

Additional aircraft and personnel associated with the proposed action would increase materials used and waste generated (solid waste, hazardous waste, and wastewater). Impacts to hazardous materials, hazardous waste, and solid waste management would be adverse, but not significant. The impacts would also be mitigated by pollution prevention programs that would reduce the potential amounts of hazardous material used and solid and hazardous waste generated. Assuming that the V-22 program would not be replaced, the no action alternative would result in a slight decrease in materials used and waste generated. If a replacement program were implemented, impacts similar to or greater than the proposed action would likely occur.

6 Noise Resources.

Potential impacts from construction noise would be insignificant because of the distance to sensitive receptors. Impacts from aircraft noise would be adverse, but insignificant, because the increase in the number of receptors exposed to greater noise levels would be minimal. This increase in noise levels from aircraft operations would not impact land use compatibility around NAS Patuxent River. If a replacement program were introduced instead of the V-22, similar impacts would occur.

7 Socioeconomics.

Impacts to socioeconomic resources could result from the relocation of personnel and their dependents associated with the proposed action. Impacts to socio-economic resources are expected to be insignificant, with a slight improvement in employment. The no action alternative would result in a decrease of personnel authorizations, resulting in very small decreases in population and employment. However, if another program with similar operations were to replace the V-22 program, similar impacts to the V-22 program would occur.

8 Water Resources.

Impacts to water resources at NAS Patuxent River would occur from aircraft support activities and construction of the ground run stand and VESTL building. The effects of construction, aircraft operations, and a small increase in personnel would not cause significant impacts to water resources at NAS Patuxent River. The increase in demand for water and production of wastewater would be insignificant. The V-22 program would not affect the 100-year floodplain bordering NAS Patuxent River nor would it adversely affect the natural value of the Patuxent River or its designation as a Scenic River. The no action alternative would result in a negligible decrease in water use and wastewater generation. If a replacement program for the V-22 would be instituted at NAWC AD Patuxent River, impacts to water resources would likely be similar to the proposed action.

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ACRONYMS AND ABBREVIATIONS

AFB	Air Force Base
AFFTC	Air Force Flight Test Center
AGL	Above Ground Level
AICUZ	Air Installation Compatible Use Zone
AOO	Air Operations Officer
APZ	Accident Potential Zone
ARPA	Archaeological Resources Protection Act
ARTCC	Air Route Traffic Control Center
ASL	Above Sea Level
BOD	Biochemical Oxygen Demand
BRAC	Base Realignment and Closure
CAA	Clean Air Act
CERL	Construction Engineering Research Laboratory (US Army Corps of Engineers)
CEQ	Council on Environmental Quality
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act of 1980
CFC	Chlorofluorocarbons
CFM	Cubic Foot Per Minute
CFR	Code of Federal Regulations
CNO	Chief of Naval Operations
CO	Carbon Monoxide
CSAR	Combat Search and Rescue
CSMA	Consolidated Metropolitan Statistical Areas
CZ	Clear Zone
dB	Decibel
dBA	Decibel on the A-weighted scale
DoD	Department of Defense
EA	Environmental Assessment
EIFS	Economic Impact Forecasting System
EIS	Environmental Impact Statement
EMD	Engineering and Manufacturing Development
EO	Executive Order
EPCRA	Emergency Planning and Community Right-to-Know Act
ESA	Endangered Species Act
EW	Electronic Warfare
FAA	Federal Aviation Administration
FICUN	Federal Interagency Committee on Urban Noise
FOT&E	Follow-on Test and Evaluation
FSD	Full-Scale Development

FY	Fiscal Year
gpd	Gallons per Day
GSE	Ground Support Equipment
GTA	Ground Test Article
HAP	Hazardous Air Pollutants
HAZMART	Hazardous Material Reutilization Center
HMM&C	Hazardous Material Management & Control
IPA	Isopropyl Alcohol
IRP	Installation Restoration Program
ITT	Integrated Test Team
ITTP	Integrated Test Team Procedures
L_{dn}	Day-Night Average Sound Level
L_{eq}	Equivalent Sound Level
LRIP	Low Rate Initial Production
MAAQS	Maryland Ambient Air Quality Standards
MDA	Methylene Dianiline
MDE	Maryland Department of the Environment
MDNR	Maryland Department of Natural Resources
MEK	Methyl Ethyl Ketone
mgd	Million Gallons Per Day
MIBK	Methyl Isobutyl Ketone
MSA	Metropolitan Statistical Area
MSL	Mean Sea Level
NAAQS	National Ambient Air Quality Standards
NAS	Naval Air Station
NATC	Naval Air Test Center
NAWC AD	Naval Air Warfare Center Aircraft Division
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NO_2 / NO_x	Nitrogen Dioxide
NOSCDR	Navy On-Scene Commander
NPDES	National Pollution Discharge Elimination System
NRHP	National Register of Historic Places
NWR	National Wildlife Refuge
NZ	Noise Zone
O_3	Ozone
ODS	Ozone Depleting Substance
OSHA	Occupation Safety and Health Act
OSRT	On-Scene Response Team

Pb	Lead
PCB	Polychlorinated Biphenyls
PCE	Perchloroethylene
PCI	Per Capita Income
PEA	Programmatic Environmental Analysis
PM_{10}	Particulate Matter with a diameter of 10 microns or less
POL	Petroleum, Oils and Lubricants
ppm	Parts Per Million
PSD	Prevention of Significant Deterioration
PWO	Public Works Officer
RCRA	Resource Conservation and Recovery Act of 1976
ROI	Region of Influence
RWATD	Rotary Wing Aircraft Test Directorate
SARA	Superfund Amendments and Reauthorization Act of 1984
SCAQMD	South Coast Air Quality Management District (California)
SEL	Sound Exposure Level
SHPO	State Historic Preservation Office/Officer
SID	Standard Instrument Departure
SIP	State Implementation Plan
SO_2 / SO_x	Sulfur Dioxide
SOF	Special Operations Forces
T&E	Threatened or Endangered [species]
TAP	Toxic Air Pollutants
TCE	Trichlorethylene
TPY	Tons Per Year
TSCA	Toxic Substances Control Act of 1976
TSP	Total Suspended Particulates
TSS	Total Suspended Solids
USC	United States Code
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USMC	United States Marine Corps
USN	United States Navy
USSOCOM	United States Special Operations Command
UST	Underground Storage Tank
VFR	Visual Flight Rules
V/STOL	Vertical/Short Takeoff and Landing
VESTL	V-22 Aircraft Electronic System Test Laboratory
VOC	Volatile Organic Compounds
WMA	Wildlife Management Area
WWTP	Wastewater Treatment Plant

CHAPTER 1
PURPOSE OF AND NEED FOR PROPOSED ACTION

1 PURPOSE OF AND NEED FOR PROPOSED ACTION

The United States Navy (USN) plans to test and evaluate the V-22 Osprey aircraft (V-22) at the Naval Air Warfare Center Aircraft Division (NAWC AD), located at the Naval Air Station (NAS) Patuxent River, Maryland. A programmatic environmental analysis (PEA) was prepared in 1994 to evaluate the overall environmental effects of the V-22 program (USN, 1994c), and provides background information for this phase- and site-specific environmental assessment (EA). This EA analyzes the USN's proposal to conduct test and evaluation of the V-22 during the Engineering and Manufacturing Development (EMD) and Low Rate Initial Production (LRIP) phases at the NAWC AD Patuxent River.

The NAWC AD Patuxent River is involved in all life-cycle phases of an aircraft, and is the USN's principal flight test and evaluation center. Chapter 1 defines the purpose and need for the V-22 test and evaluation program at the NAWC AD Patuxent River, and provides background information and history on test and evaluation at the NAWC AD Patuxent River.

This EA is prepared in accordance with the National Environmental Policy Act (NEPA) of 1969, Council on Environmental Quality (CEQ) regulations (40 CFR §1500-1508), 32 CFR Chapter VI, part 775, and OPNAVINST 5090.1B (1 Nov 94). This EA addresses the "continuing activities" of the V-22 test and evaluation process, and evaluates the potential impact to the biological, physical, and human environs from the proposed action and the no action alternative.

1.1 PROGRAM DESCRIPTION

The V-22 is a multi-service, multi-mission tilt-rotor vertical/short takeoff and landing (V/STOL) aircraft being developed for operational use beginning in the year 2001. The V-22 would conduct worldwide operations during contingencies, and conventional and unconventional warfare. The primary missions of the V-22 would be amphibious assault, combat search and rescue (CSAR), and long-range infiltration, exfiltration, and resupply of Special Operations Forces (SOF). The amphibious assault aircraft (MV-22) is the Marine Corps version, the CSAR aircraft (HV-22) is the Navy version, and the SOF aircraft (CV-22) is the United States Special Operations Command (USSOCOM) version of the V-22. Secondary missions would include land assault, medical evacuation (medevac), fleet logistics support, and special warfare. The V-22 would replace the CH-46E and CH53A/D in the U.S. Marine Corps (USMC), augment the HH-60H in the USN, and replace the MH-53J and MC-130 in USSOCOM.

The V-22 is designed to operate in adverse weather, in day or night operations. The tilt-rotor permits vertical take-offs and landings as a rotor craft (hover mode), and transitions to forward flight in a turboprop configuration (airplane mode). The V-22 is described in detail in Section 2.1.1.

The NAWC AD Patuxent River is the Navy's principal center for flight test and evaluation activities for air platforms. The NAWC AD Patuxent River supports technology demonstration and validation, Full Scale Development (FSD), EMD, LRIP, production, deployment, fleet operations, and fleet in-service engineering.

Acquisition of a weapon system, such as the V-22, is a directed and funded effort by the Department of Defense (DoD). The acquisition is designed to provide a new or improved materiel capability in response to a validated need. DoD Directives 5000.1 and 5000.2 establish the integrated management framework which supports the milestones and phases of the acquisition process. The requirements for the V-22 include the standard DoD milestones and program phases, and an added Milestone II Plus (which approved the EMD baseline configuration and authorized the LRIP of the MV-22). The EMD baseline corrected FSD deficiencies, and incorporated significant weight and cost reduction programs. These steps are shown schematically in Figure 1.1-1, and discussed in the following paragraphs. The bolded figures identify the steps being considered in this document.

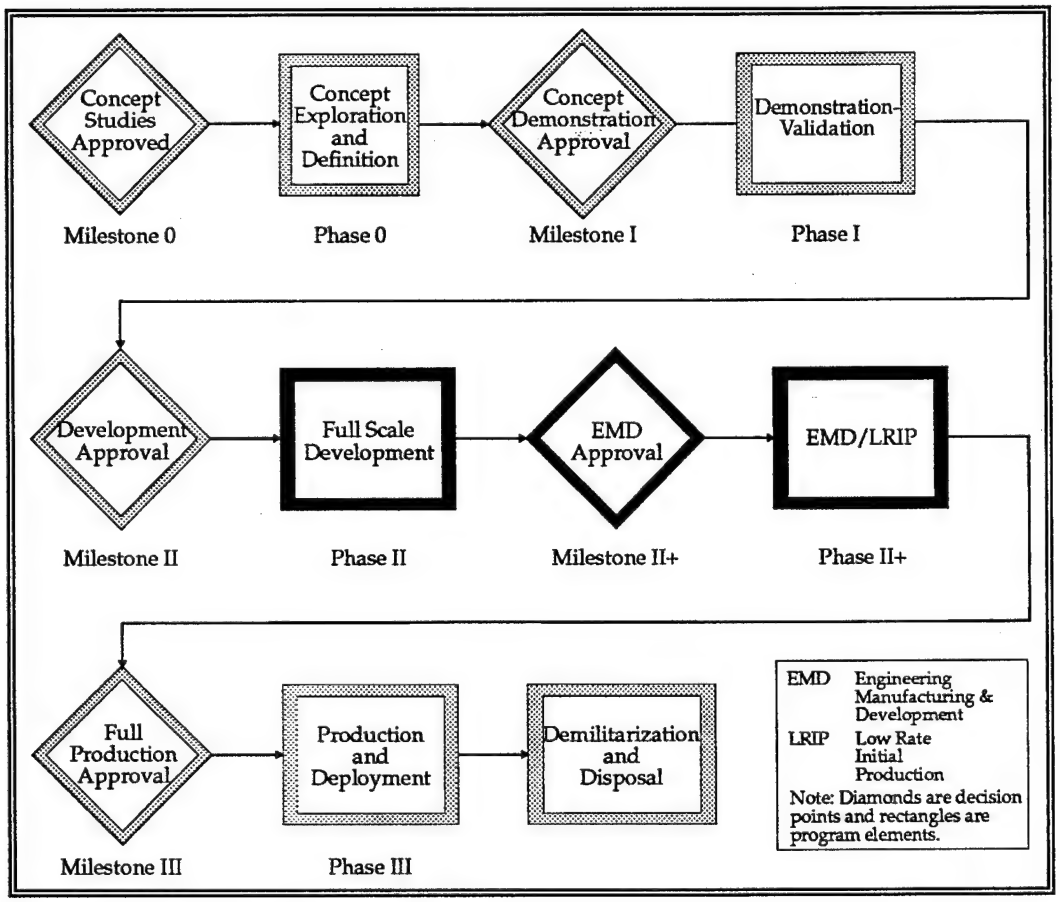

Figure 1.1-1 V-22 Program Phases

Concept Exploration—The objectives of this phase are to explore various options for meeting mission need and to define critical design characteristics. This phase involves literature reviews of existing technologies, computer-aided design, consideration of mission requirements, and trade-off analyses of preliminary designs.

Demonstration-Validation—The objectives of this phase are to demonstrate that technologies critical to the most promising concepts can be incorporated in the system design. In addition, the demonstration-validation phase involves testing to demonstrate that system capabilities meet operational performance requirements and to validate the manufacturing processes. The initial concept studies (Milestone 0) were approved in December 1981, and Concept Demonstration Approval (Milestone I) occurred in December 1982. The Joint Services Operational Requirement document, requiring replacement of the current fleet of medium lift aircraft, was approved in April 1985 (USN, 1994c).

Full-Scale Development—This life-cycle support phase involved manufacturing six prototypes of the aircraft to conduct initial testing of capabilities. Material, processes, and part studies were integral elements of this phase. A hybrid construction of aluminum and composite materials (graphite-epoxy and fiberglass) was selected for the airframe to provide improved strength-to-weight ratio, corrosion resistance, and damage tolerance.

After Milestone II approval, an FSD contract was awarded to Bell Helicopter Textron, Incorporated and Boeing Helicopter Company in May 1986. The companies produced aircraft both for flight testing and ground testing. The first flight of the FSD aircraft occurred in March 1989.

Six V-22 were produced during the FSD contract. Aircraft #1, #2, #3, #4, and #5 were used for flight testing under FSD. Aircraft #1 was flown 215 hours, and is currently used for parts for active aircraft. Aircraft #2 and #3 were transferred to the EMD contract and continued to be tested under the EMD phase. Flight testing of aircraft #2 stopped by the end of 1994, but the aircraft was readied at NAS Patuxent River in March and April 1995, and delivered in May 1995 for the Paris Air Show. Aircraft #2 is expected to be returned in July 1995, and will be kept in storage. Aircraft #3 would continue to be tested under the EMD contract. Aircraft #4 and #5 crashed during the initial stages of the program. Aircraft #6 was never completely assembled or intended to be flown, and was taken to the China Lake, California test range for live fire testing (the aircraft survivability would be evaluated after being fired upon with various projectiles).

Engineering and Manufacturing Development—This phase replaced FSD in accordance with changes made in DoD 5000.2. This phase involves testing four aircraft to incorporate further capabilities prior to a production decision. The EMD program was evaluated to determine whether to proceed with Low Rate Initial Production. This phase began with the award of a contract to Bell and

Boeing in October 1992. Developmental test flying of FSD aircraft resumed in June 1993 following modifications to fix identified engineering deficiencies.

During a typical EMD phase, the contractor fully tests an aircraft prior to turning it over to the government. The government performs the same or similar developmental tests, and often requests changes to meet requirements. The test process is then repeated. However, the EMD phase for the V-22 incorporates the use of an Integrated Test Team (ITT) to expedite the test process. The ITT uses both contractor and government personnel, including test pilots, to conduct various tests. By using an integrated team, government personnel can validate test data and identify deficiencies during the initial test cycle, and immediately correct deficiencies in the aircraft. This concurrent process eliminates the redundant testing that is often otherwise needed. Tests to be conducted under this phase are described in Chapter 2.

Aircraft #7-10 (MV-22) are planned to be produced and tested under the EMD contract. Tests for these aircraft are described in Chapter 2.

Low Rate Initial Production—This phase involves manufacturing 16 production V-22s to conduct initial testing of capabilities. Aircraft #11 (CV-22) is to be produced under the EMD phase in 1997 with a proposed contract modification in 1995. Details of the testing are described in Chapter 2.

Production—Production of the EMD V-22s would occur at Bell Helicopter Textron, Incorporated in Fort Worth, Texas and Boeing Helicopter Company in Philadelphia, Pennsylvania. The aircraft would be assembled in the Bell facilities in Fort Worth.

Deployment—This phase includes basing the V-22 at designated locations, and depot maintenance at Naval Aviation Depot Cherry Point Marine Corps Air Station, North Carolina. The first operational site scheduled to receive the V-22 would be Marine Corps Air Station New River, North Carolina. Additional Navy, Marine Corps, and USSOCOM deployment sites have not been determined at this time (USN, 1994c).

Demilitarization and Disposal—Deactivation of the system would involve disposal or reuse of the aircraft components in an economical and environmentally safe manner at the end of the useful life of the aircraft. Decommissioning activities are typically conducted at government facilities. A demilitarization and disposal plan in accordance with DODINST 5000.2, DoD 4160.21-M-1 (Defense Demilitarization Manual), and NAVAIRINST 4500.11 (Policy and Procedures for Aircraft, Aircraft Engines, and Related Aeronautical Items Reclamation and Disposal Program) will be prepared.

1.2 PURPOSE AND NEED

The purpose of the testing and evaluation of the V-22 at NAWC AD Patuxent River is to ensure that the aircraft can meet the medium lift amphibious/vertical assault needs of the USMC, the strike rescue needs of the USN, and the special operations needs of the USSOCOM.

The need to conduct the V-22 test and evaluation program is to support the development of an aircraft that can meet new demands for medium lift aircraft. The current fleet has several shortfalls in the medium lift force, which severely limit the USMC assault support mission. The shortfalls are an inadequate number of airframes (a total of 294 aircraft to support a requirement for 376); inadequate payload, range, and speed; inadequate capability to communicate, navigate, and operate in adverse weather conditions by day or night; no self-deploy or aerial refuel capabilities; inadequate capability to operate in a nuclear, biological, or chemical environment; inadequate threat detection and self-protection; unacceptably high maintenance and inspection tasks; and inadequate combat survivability and crashworthiness.

The changes are a response to the change in America's national security policy. The focus for the U.S. military has shifted from a major cold war confrontation to one of expeditionary power projection. For the USN, a cold war, open ocean, blue water strategy has shifted to power projection in a regional and littoral environment. The V-22 must not only meet conventional threats, but must be fully capable of conducting worldwide operations in unconventional and contingency combat, including chemical and biological warfare, tactical nuclear warfare, and directed energy warfare conditions.

1.3 LOCATION OF THE PROPOSED ACTION

The NAS Patuxent River is located in St. Mary's County, Maryland, on a peninsula between the Patuxent River to the north, and Chesapeake Bay to the east and south. The NAS Patuxent River is about 65 miles southeast of Washington, and is located adjacent to the town of Lexington Park, MD. The general location is shown in Figure 1.3-1. Highway access is provided through the county by way of State Highways 5 and 235 (see Figure 1.3-2).

There are approximately 7,124 acres of land at NAS Patuxent River (USN, 1994b). The property includes a wide diversity of ecological settings, including beach and dune areas, brackish and saltwater estuaries, marshlands, open fields, fresh water ponds, pine forest areas, and deciduous forest areas.

1.4 LAWS AND REGULATIONS

A brief summary of the federal, state, and local laws and regulations that may be applicable to the proposed action is provided in the following paragraphs.

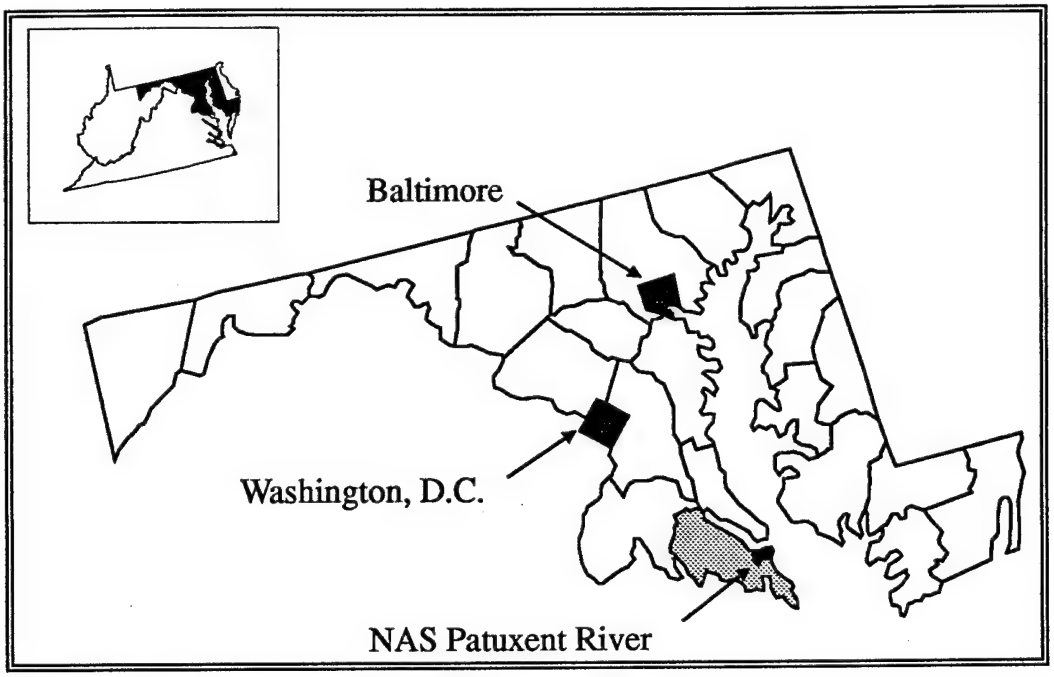

Figure 1.3-1 Location of the NAS Patuxent River

1.4.1 Environmental Policy

The National Environmental Policy Act of 1969 [42 United States Code (USC) 4321 et seq.] establishes national policy, sets goals, and provides the means to prevent or eliminate damage to the environment. NEPA procedures ensure that information about environmental impacts is available to public officials and citizens before decisions are made on major federal actions that may significantly affect the environment. The CEQ regulations implement the procedural provisions of NEPA.

Executive Order (EO) 11514, Protection and Enhancement of Environmental Quality, as amended by EO 11991, sets the policy for directing the Federal Government in providing leadership in protecting and enhancing the quality of the nation's environment.

32 CFR Ch. VI, part 775, provides a process for making decisions based on an understanding of potential environmental consequences of proposed actions and alternatives, and gives specific procedural requirements for the implementation of NEPA.

OPNAVINST 5090.1B, the Environmental and Natural Resources Program Manual, Chapter 2, provides Navy procedures for implementing NEPA.

EO 12989, Federal Actions to Address Environmental Justice in Minority Populations and Low-income Populations, directs federal agencies to prevent

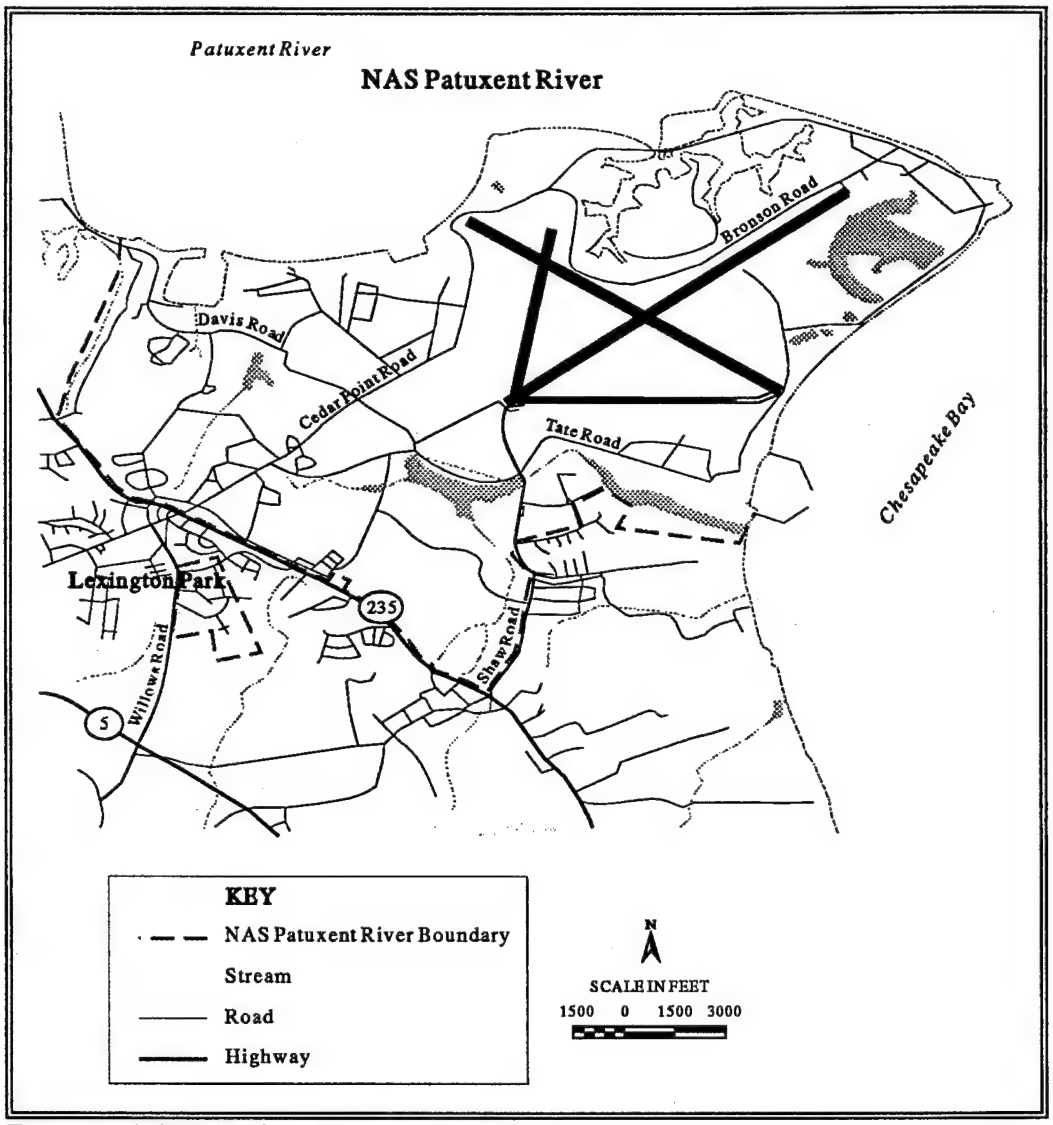

Figure 1.3-2 NAS Patuxent River

disproportionately high and adverse human or environmental impacts caused by federal actions from occurring on the aforementioned populations.

1.4.2 Air Quality

The Clean Air Act (CAA) [42 USC 7401 et seq., as amended] establishes federal policy to protect and enhance the quality of the Nation's air resources to protect human health and the environment. The CAA sets national primary and secondary ambient air quality standards as a framework for air pollution control.

The Air Quality Control Act [Maryland Code, Title 2, Chapter 240] states that it is the policy of the State of Maryland to maintain the degree of air purity necessary to protect the health, general welfare, and property of the people.

The Air Pollution Control Regulations [Maryland Code, Title 26, Subtitle 11] provide guidelines for which the primary purpose is to reduce the discharge of emissions into the atmosphere in order to comply with air pollution control requirements.

1.4.3 Biological Resources

EO 11990, Protection of Wetlands, requires federal agencies to take action to avoid, to the extent practicable, the destruction, loss, or degradation of wetlands and to preserve and enhance the natural and beneficial values of wetlands. The intent of EO 11990 is to avoid direct or indirect construction in wetlands if a feasible alternative is available. All federal and federally supported activities and projects must comply with EO 11990.

Maryland Wetlands Law [Maryland Code, Title 9] requires agencies to take action to protect wetlands and riparian rights from being lost or despoiled by unregulated dredging, dumping, filling, or like activities.

Maryland Wetlands Regulations [Maryland Code, Title 8, Subtitle 5] requires agencies to take action to avoid the destruction, loss, or degradation of wetlands.

The Chesapeake Bay Critical Area Commission [NRA Articles 8-1801-1816] identifies state protected species.

The Endangered Species Act [16 USC 1531-1543] requires federal agencies that authorize, fund, or carry out actions to avoid jeopardizing the continued existence of threatened or endangered species, and to avoid destroying or adversely modifying their critical habitat. Federal agencies must evaluate the effects of their actions on threatened or endangered species of fish, wildlife, and plants, and their critical habitats and take steps to conserve and protect these species. All potentially adverse impacts to threatened or endangered species must be avoided or mitigated.

The Bald and Golden Eagle Protection Act [16 USC 668] protects bald and golden eagles from being pursued, hunted, collected, molested or otherwise disturbed.

EO 11988, Floodplain Management, requires federal agencies to evaluate the potential effects of actions on floodplains and to avoid adverse floodplain impacts wherever possible.

1.4.4 Cultural Resources

The National Historic Preservation Act (NHPA) of 1966 [16 USC 470 et seq,. as amended] requires federal agencies to determine the effect of their actions on cultural resources and take certain steps to ensure these resources are located, identified, evaluated, and protected.

The Archaeological Resources Protection Act (ARPA) [16 USC 470a-11, as amended] protects archeological resources on federal lands. If archaeological resources are discovered that may be disturbed during site activities, the Act requires permits for excavating and removing the resource.

1.4.5 Public Health and Safety/Hazardous Materials and Waste

Maryland Underground Storage Tank (UST) Regulations [Maryland Code, Title 26, Subtitle 10] provides monitoring standards for new and existing USTs, and for repair, upgrade, and closure of USTs.

Maryland Recycling Law [Maryland Code, Title 9, Subtitle 17] requires agencies to incorporate waste prevention and recycling in daily operations.

Maryland Used Oil Recycling Act [Maryland Code, Title 8, Subtitles 14 and 20] provides for recycling of used oil to the maximum extent possible.

Maryland Hazardous Substances Spill Response Law [Title 7, Subtitle 2] provides additional and cumulative remedies to prevent, abate, and control pollution of the waters of Maryland.

Maryland Solid Waste Management Regulations [Title 26, Subtitle 04] specify requirements in the construction, operation, and management of solid waste disposal facilities in the state and outline minimum management requirements for generators of solid waste.

The Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended by the Superfund Amendments and Reauthorization Act (SARA) [42 USC 9601 *et seq.*] provides for funding, enforcement, response, and liability for the release or threatened release of hazardous substances into the environment.

The Resource Conservation and Recovery Act (RCRA) of 1976 [42 USC 6901], as amended, requires federal agencies to comply with all federal, state, interstate, and local regulations respecting control and abatement of solid waste or hazardous waste disposal.

The Installation Restoration Program (IRP) is a DoD policy designed to identify, confirm, quantify, and remediate suspected problems associated with past hazardous material disposal sites on DoD installations. The Defense Environmental Restoration Program [10 USC 2701 et seq.] is the legal mandate for the IRP.

The Hazardous Waste Regulations [Maryland Code, Title 26, Subtitle 13] set forth the requirements that generators, transporters, or owners or operators of treatment, storage, or disposal facilities shall follow.

The Occupational Safety and Health Act (OSHA) of 1970, provides regulations designed to protect the health and safety of employees in the workplace.

The Emergency Planning and Community Right-to-Know Act (EPCRA) of 1986, sets forth the requirements for emergency planning, including timely notification and response to a release of hazardous substances.

1.4.6 Water Quality

Maryland Coastal Facilities Review Act [Maryland Code, Title 6, Subtitle 5] specifies the provisions for protecting Maryland's coastal areas.

The Clean Water Act [33 USC 1251 et seq., as amended] establishes federal limits, through the National Pollution Discharge Elimination System (NPDES), on the amounts of specific pollutants that are discharged to surface waters in order to restore and maintain the chemical, physical, and biological integrity of the water. A NPDES permit, or modification to an existing permit, would be required for any change from the present parameters in the quality or quantity of wastewater discharge and/or stormwater runoff.

The Water Pollution Control Law [Maryland Code, Title 9, Chapter 240] establishes effective programs and provides remedies to prevent, abate, and control pollution of the waters of this state.

The Water Pollution Control Regulations [Maryland Code, Title 26, Subtitle 08] establish responsibilities to improve, conserve, and manage the quality of the waters of the state.

1.4.7 Flight Safety

Federal Aviation Administration (FAA) Regulations [14 CFR 71, 73, 91, 93 et seq.] designate airspace assignments and prescribe the requirements for the use of restricted and prohibited areas. These FAA regulations specify the general operating and flight rules for aircraft within the United States and prescribe standard instrument approach procedures for airports.

1.4.8 Noise

The Noise Control Act of 1972 [42 USC 4901 et. seq., Public Law 92-574] establishes a policy to promote an environment free from noise harmful to health or welfare of people. Federal agencies must also comply with state and local requirements for the control and abatement of environmental noise.

1.4.9 Land Use

EO 12372, Intergovernmental Review of Federal Programs, directs federal agencies to consult with and solicit comments from state and local government officials whose jurisdictions would be affected by federal actions.

The Air Installation Compatible Use Zone (AICUZ) Program, establishes the basic objective of achieving compatible uses of public and private lands in the vicinity of military airfields by restricting incompatible development. This program describes noise conditions and safety zones on and near the military installation.

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CHAPTER 2
DESCRIPTION OF ACTION AND ALTERNATIVES

2 DESCRIPTION OF ACTION AND ALTERNATIVES

The USN proposes to test and evaluate the V-22 at the NAS Patuxent River under the guidance of the NAWC AD Patuxent River. The test and evaluation would include the EMD and production phases of development. The first risk reduction flight testing of the V-22 at NAWC AD Patuxent River occurred in March 1989, and has continued to date under different program phases. The test program started with tests designed to improve or resolve discovered problems, supplemented by tests to understand the engineering characteristics and capabilities of the aircraft. As the test program has evolved, a higher proportion of tests have been allocated to understanding the engineering characteristics and fewer improvement tests have been needed.

The proposed action includes the basing and testing of the V-22 at NAWC AD Patuxent River during the EMD and LRIP phases. Alternate locations for the testing, and a no action alternative, are also considered in the following sections.

2.1 PROPOSED ACTION

The proposed action is a continuation of the test and evaluation of the V-22 through the EMD and LRIP phases. The EMD test phase currently uses a previously manufactured V-22 (number 3) from the preceding FSD contract to conduct an EMD risk reduction flight program. Four MV-22 type aircraft will be produced for the U.S. Marine Corps under the EMD contract. These aircraft are numbered 7 through 10. The EMD contract will be modified in 1995 to add a Special Operations Command CV-22 type aircraft (aircraft number 11). The LRIP would continue with the Follow-on Test and Evaluation (FOT&E) of initial production MV-22 type aircraft at the Marine Corps Air Facility in Quantico, Virginia.

This EA focuses on the planned EMD and LRIP phases, and also provides a background on the early phases of the program at NAWC AD Patuxent River. The following sections describe the aircraft, support systems, personnel associated with the action, and the types of operations that would be conducted at the NAWC AD Patuxent River during the EMD and LRIP phases.

2.1.1 Aircraft

The V-22 is a tilt-rotor V/STOL medium lift transport aircraft capable of adverse weather and day or night operations. The V-22 would be capable of operating from remote bases in austere environments and aboard ships. The tilt-rotor is designed to permit take-off and vertical landing as a rotor craft (hover mode) and transition to forward flight into a turboprop configuration (airplane mode). The V-22 is capable of air-to-air refueling and worldwide self-deployment. The design uses advanced but mature technology that has been tested in the XV-15 tilt-rotor

demonstrators and the V-22 FSD models, and incorporated into the V-22 EMD models. The V-22 uses proven composite materials, digital fly-by-wire flight controls, and advanced survivability and crashworthiness design.

The airframe is constructed primarily of graphite-reinforced epoxy composite material. The fuselage is a hybrid construction, with a composite skin and aluminum frame. The aircraft is configured with a high wing supporting two engine nacelles, as shown in Figure 2.1-2. Two Allison 6150 HP class T406-AD-400 turboshaft engines are housed in the nacelles. The engines employ state-of-the-art technology and design features derived from the T56-A variant engine programs.

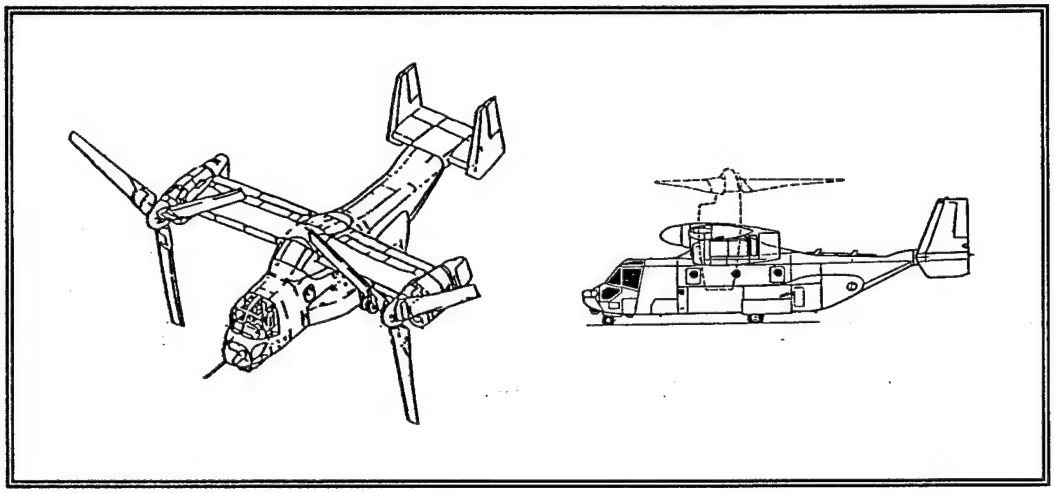

Figure 2.1-2 Profile of the V-22

2.1.2 Support Systems

The V-22 aircraft are currently sheltered in Hangar 109 and are flown and maintained as a joint venture between government and contractor personnel. Maintenance is and would remain a contractor effort through the test phases at NAWC AD Patuxent River. The USN is planning a three-level maintenance concept—organizational, intermediate, and depot maintenance. Organizational maintenance would include the day-to-day support operations. Intermediate maintenance would include only minor maintenance and parts changes at the NAWC AD Patuxent River. If depot maintenance is required, the entire component section (such as a complete engine) would be removed and repaired at a contractor facility.

A new V-22 ground run stand is scheduled to be constructed within the bounds of the airfield, as shown in Figure 2.1-3. The site location is in a flight operations area to provide easy access for test operations. This location is also compatible with other operations in the area, and minimizes the effects (e.g., noise) of extended test runs to base personnel.

A V-22 Aircraft Electronic System Test Laboratory (VESTL) is scheduled to be built approximately 60 feet southwest of Hangar 109 (See Figure 2.1-3). The facility would be approximately 5,000 square feet, with construction planned for the last quarter of 1995 or the first quarter of 1996. The primary function of the facility is to provide on-site testing of aircraft equipment, systems integrations, testing, data analysis, and trouble shooting. Testing activities are currently occurring in a modular facility and the operations would move into the new facility before 1997 (Brown, 1995).

The approximate personnel totals anticipated to be needed for the V-22 program at NAWC AD Patuxent River are shown in Table 2.1-1. These numbers include personnel working at NAS Patuxent River during the EMD and LRIP phases. The totals are broken down as military, Bell-Boeing employees, and other civilian and support contractors. The aircraft arrived in December 1993 with most government personnel already in place. The Bell-Boeing personnel working at NAS Patuxent River for fiscal year (FY) 1994 totalled 130 people. These employees maintain the aircraft and equipment used in the testing program. Civilian personnel include civil servants (government employees), private industry (Bell-Boeing) personnel, and contractor support personnel. The support contractors perform administrative, guard, cleaning, and similar functions.

Table 2.1-1
Personnel Authorizations for the V-22 Test Program

Fiscal Year	'94	'95	'96	'97	'98	'99	'00	'01	'02-04
Bell-Boeing	130	100	100	250	250	150	[3]	[3]	[3]/yr
Civilian (Gov't)	[1]	50	64[2]	78	75	61	51	49	60/yr
Military	[1]	103	103[2]	103	91	89	72	69	20/yr
Support Contractors	20	20	20[2]	30	30	30	20	20	20/yr
Totals	150[1]	273	287[2]	461	446	430	393	388	195/yr

[1] Exact numbers of civilian and military personnel are unknown but would be similar to FY '95 levels.
[2] Aircraft #7 is now programmed for arrival at NAS Patuxent River by February 1997. Consequently, personnel numbers in FY '96 would be similar to those in FY '95 (Brown, 1995).
[3] LRIP requirements not yet defined.
Source: ITT, 1994; Brown, 1995

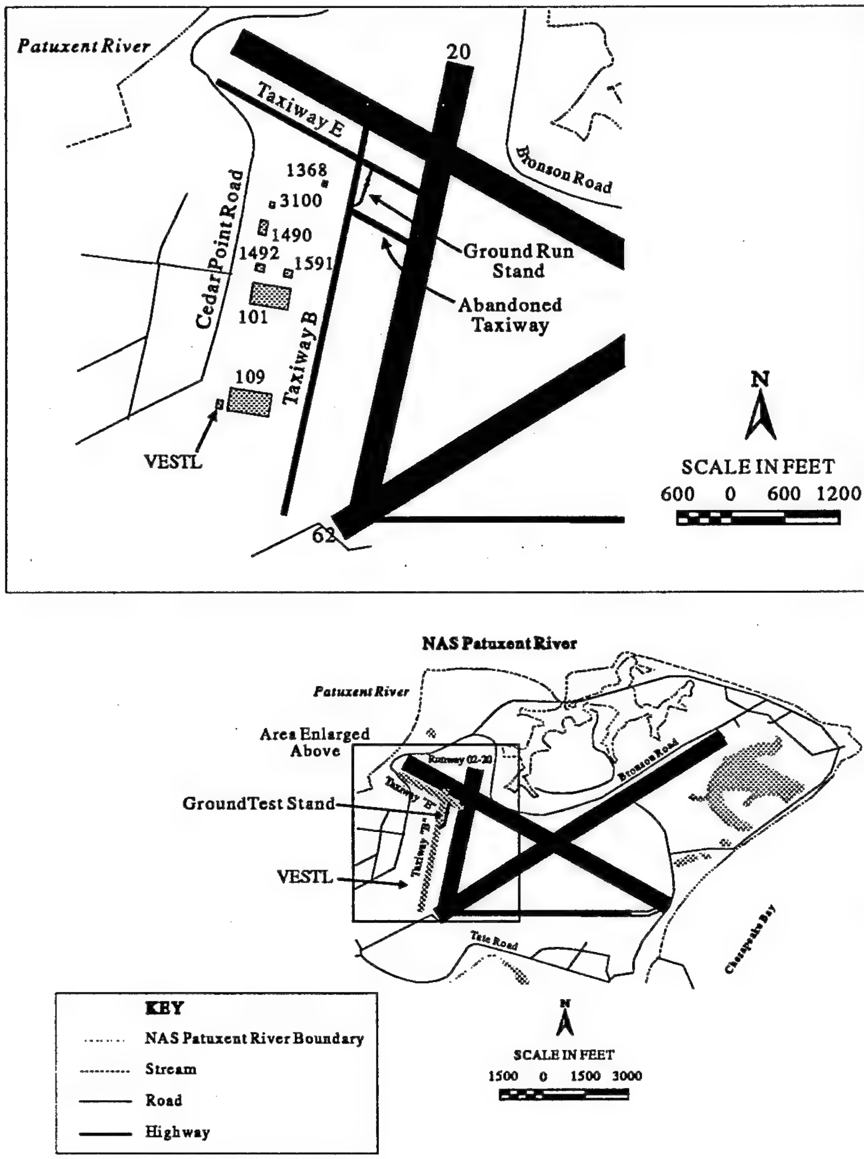

Figure 2.1-3 Proposed Location of the Ground Run Stand and VESTL

2.1.3 Operations

Currently, there is one operating V-22 (aircraft #3) at NAWC AD Patuxent River. Aircraft #2 is completing an air show in Paris and will return for storage in July 1995. Each aircraft averaged less than one test flight per day during 1994. As of 14 July 1995, Aircraft #1, 2, 3, and 4 flew approximately 1,040 hours. During 1994, aircraft #2 and 3 flew approximately 180 hours at NAWC AD Patuxent River (Kumpel, 1995). Aircraft #3 is scheduled to be tested through March 1997. The test goal for the testing program at NAWC AD Patuxent River is 20 flight hours per month per aircraft, with an average of 1.5 hours per flight (Brown, 1995).

Test flights (FY 94) of aircraft #2 have included shakedown and ferry tests, artificial icing shakedowns and icing trials, operational training, and flying qualities and performance tests. Tests of aircraft #3 have included shakedown and ferry tests, ground runs, icing prerequisites and configuration definition, light gross weight envelope definition, heavy gross weight envelope definition, performance/height-velocity tests, external load tests, high angle of attack tests, and sea trials.

The remaining EMD and LRIP tests would be performed during 1995 and the following years. This testing would include numerous tests that can generally be described under the categories briefly discussed in the following paragraphs and summarized in Table 2.1-2. Testing activities with chaff, flares or other materials are planned to occur at the China Lake Naval Air Warfare Center Weapons Division facilities at NAS China Lake, California.

2.1.4 Ground Testing

The Ground Test Article (GTA) is located in Arlington, Texas, where all initial flight testing is programmed to occur. The GTA consists of a wing, pylon, rotor, and drive system (including electrical, fuel, and avionic systems), and is mounted on a support stand. All tests mentioned in this section, with the exception of grass burn and flow visuality tests, are planned to occur in Texas. The *10 hour Rotor Aeroelastic Whirl Test* consists of aeroelastic (rotor stability and speed), dynamic load, stress, and motion surveys.

The *50 hour Preliminary Flight Acceptance Test* consists of engine operations at all power levels (from idle to maximum overspeed) at various nacelle positions to demonstrate that the drive system is safe for flight. The *150 hour Preproduction Test* would be similar to the Preliminary Flight Acceptance Test. The purpose of this test is to demonstrate reasonable operating intervals without failures and to test any modifications that could be made during previous testing. Next, the GTA would complete the *250 hour Ground Endurance Test.* Additional testing of the GTA includes a *Rotor Brake Test*, during which the GTA is

Table 2.1-2
Testing Program for the V-22

Testing	Major Tests Performed
Ground	**Ground Test Article** • 10 Hour Rotor Aeroelastic Whirl Test • 50 Hour Preliminary Flight Acceptance Test • 150 Hour Preproduction Test • 250 Hour Ground Endurance Test • Rotor Brake Test • Vibration Diagnostics Testing **Functional Ground Checkout** **Dynamic Preflight Tests** **Flow Visuality Tests**
Flight	**Flight Loads Survey** **Powerplant Survey** **Structural Demonstration** • Flight Loads, Flight Stress, and Flight Limitations Testing • Flight Vibration Tests **Aerodynamic Demonstration** • Flying Qualities • High Angle of Attack • Performance Tests and Drag Measurements **Power Plant Demonstration** • Engine Power Output Tests • Aeroelastic Stability Demonstration **Equipment Demonstration** • Blade Fold, Engine Nacelle Conversion, Wing Stow Demonstration • Load Handling and Hoist Tests • Aerial Refueling, Hover Inflight Refueling **Electrical Demonstration** **Hydraulic System** • Functional Tests • Temperature, Pressure, and Vibration Tests **Avionics Demonstration** • Performance Tests • Instruments Demonstration **Reliability and Maintainability** **Survivability, Vunerability, and Crashworthiness Testing**

Source: Bell-Boeing, 1994a

subjected to an emergency braking stop from 100 percent engine speed, and the *Vibration Diagnostics Testing*, which examines the effects of shaft imbalance, misalignment, and loss of lubrication. Ground testing is scheduled to occur from July 1995 to August 1997.

A *Functional Ground Checkout* would be conducted before each flight test. This includes an examination of all subsystems of the aircraft to verify readiness for flight. The *Dynamics Preflight Tests* include ground vibration and mechanical instability checks.

Thermal Decrement Grass Burn tests would be conducted to quantify the hot exhaust ground environment during operations. One test was conducted approximately 10 feet west from the edge of concrete near the end of Runway 20 at NAS Patuxent River and determined the potential for igniting grass with hot exhaust gases from the V-22. Further testing under different conditions is being considered (Porter, 1995).

Flow Visuality testing would be conducted by using two 4,000 cubic foot per minute (CFM) smoke generators. These tests would be conducted off the approach end of Runway 20 at the tethered hover site, and would be designed to determine the downwash patterns from the rotors.

2.1.5 Flight Testing

Testing of aircraft #7-10 would include a flight loads survey, powerplant surveys, structural demonstrations, aerodynamic demonstrations, powerplant demonstrations, equipment demonstrations, electrical demonstrations, avionics demonstrations, shipboard suitability, aircraft reliability and maintainability, and survivability testing. Flight tests are scheduled at NAS Patuxent River from February 1997 through April 1999.

A *Flight Loads Survey* would be conducted to determine the loads and strains and evaluate fatigue in the critical components of the aircraft. Plans are to use zinc ballast plates, replacing the lead plates typically used in this type of test, because of potential toxicity problems with lead. Components of this survey are scheduled for 1997 and 1998.

The *Powerplant Survey* would be conducted to verify satisfactory vibration, cooling, and compressor inlet and turbine outlet pressure. These would be determined at five nacelle angles (ranging from 0° to 90°) during selected flight conditions. These tests are scheduled for early 1998 to mid-1998.

The *Structural Demonstration* would be completed to verify the structural integrity of the aircraft and to demonstrate safe operation during specified maneuvers at different attitudes and angular rates. These tests would take place in 1998.

The *Aerodynamic Demonstration* includes the Flying Qualities Demonstration, Performance Test and Drag Measurements, and High Angle of Attack Demonstration. Height-Velocity , takeoff and landing, and in ground effect handling qualities at sea level and high altitude are included in the Flying Qualities Demonstration. Performance and Drag Measurements include hovering in and out of ground effect, level flight, short takeoff and landing, and maneuver characteristics. High Angle of Attack tests include buffet onset and characteristics, pitch control limits, approach to stall characteristics, and stall-departure characteristics. The aerodynamic demonstration is scheduled to occur in 1998.

The *Powerplant Demonstration* would be conducted to verify satisfactory engine power control and management throughout the aircraft operating envelope. The auxiliary power unit and main engine fire extinguishing systems on aircraft #8 would be tested prior to flight by recording extinguishing agent concentration during hover, transition, and cruise flight conditions and by monitoring the fire and overheat detection systems. Fuel system performance would also be tested. These tests could be performed in conjunction with other testing (such as structural, dynamic, and aerodynamic demonstrations) whenever feasible. They are scheduled for late 1997.

The *Equipment Demonstration* includes measuring blade fold, engine nacelle conversion, and wing stow demonstration (both ground and flight tests); and landing gear system demonstration (consisting of taxi, ground, and flight tests to test retraction and extension of landing gear, and tests of nose gear steering and wheel brake function). The internal cargo system and hoist would be tested for maximum load and function. These tests are scheduled for 1997.

The *Electrical Demonstration* consists of ground and flight tests to determine the capability of the electrical systems to perform within the extreme limits of the mission envelope for which the aircraft was designed. Main power, emergency power, and lighting are to be tested. The electrical demonstration is scheduled for 1997.

The *Hydraulic System Demonstration* includes functional tests of the hydraulics subsystem within the extreme limits of the flight envelope for the aircraft. Landing gear retraction would be tested at maximum airspeed. Backup systems (e.g., emergency landing gear and flight controls) would be tested. Vibration and temperatures of the hydraulics subsystems would be monitored during these flights. Critical components of the system would be monitored for pressure during flight testing and inspected for leaks, damage, or failure after the tests are completed. Hydraulic demonstrations are scheduled for 1997.

The *Avionics Demonstration* would be conducted to verify performance of the avionics (communication, navigation, flight control, instrumentation, electronic warfare, and countermeasures) system. The performance of all of these systems would be tested in ground and flight tests. Avionics Demonstrations would occur in 1997 and 1998.

Reliability and Maintainability Tests, consisting of a maintenance engineering inspection and a technical evaluation, would be conducted to detect faults, test access to parts, test removal and replacement of components, and to perform system checkout. These tests are scheduled for 1999.

The *Survivability, Vulnerability, and Crashworthiness Test Program* is a series of verification and demonstration tests performed on the ground and in flight. An infrared signature survey would be conducted at NAWC AD Patuxent River

facilities and would be conducted in both hover and flight modes. Survivability and Vulnerability tests, conducted at other facilities, would measure the impact of ballistic objects on structural components of the aircraft.

If the Air Force accepts the core type of V-22 (MV type), aircraft #11 tests (under the EMD phase) would be limited to structural flights to verify the radar installation. Testing of modifications, if any, would occur at NAWC AD Patuxent River.

The projected flight test missions would be flown within local tower traffic patterns and restricted areas (R4002/R4005/R4006/R4007) currently used by NAWC AD Patuxent River. Figure 2.1-4 illustrates the restricted areas. The operations profile would include the following characteristics: departures are made via standard instrument departure (SID) or visual flight rules (VFR) with the tower from R4007; primary test ranges used are R4002/R4005/R4006; recovery of aircraft would occur via established approaches or VFR with the tower at altitudes from the surface to 2,000 feet mean sea level (MSL); and aircraft would predominantly takeoff and land at NAWC AD Patuxent River.

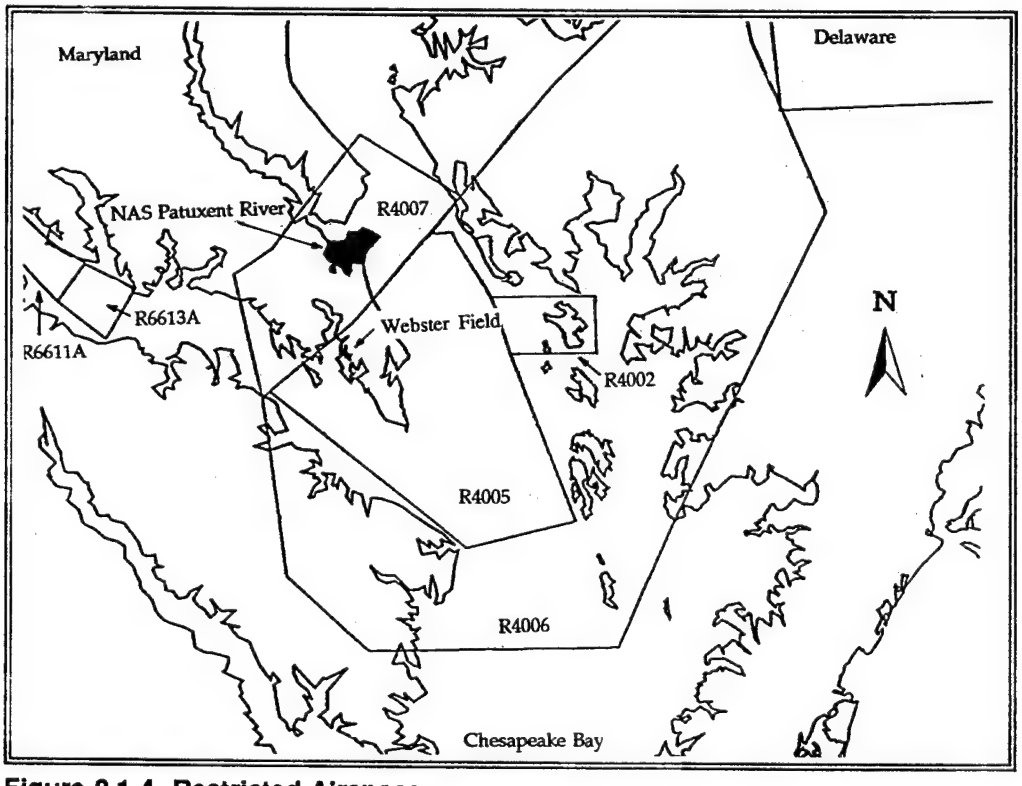

Figure 2.1-4 Restricted Airspace

Restricted areas contain airspace identified by an area within which the flight of aircraft, while not wholly prohibited, is subject to restrictions. Restricted areas denote the existence of unusual hazards to aircraft such as artillery firing. Aircraft

operating within restricted airspace are given discrete altitude clearances in order to maintain vertical separation from other aircraft also operating within the restricted area. Those restricted areas used are described below.

- R4002 — Operating altitudes are surface to 20,000 ft. This area surrounds Bloodsworth Island, a bird sanctuary. This area is used as a bombing and naval gunfire range, except for the period from mid-October through February when range activities (i.e., bombing) are prohibited due to the presence of migratory waterfowl.
- R4005 — Operating altitudes are surface to 25,000 ft. This is the most heavily used of the areas. It is further divided into R4005N, R4005S, and R4005W. The flight test missions normally use R4005N and R4005S. There are helicopter missions that usually occupy R4005W, which is over Webster Field. Within the R4005N area, in addition to flight testing, ordinance delivery is tested as the area has instrumented tracking and targeting systems associated with it. Weapon delivery within the R4005S area is limited to testing without tracking systems, because it is too far from shore for reliable tracking systems.
- R4006 — Operating altitudes are 3,500 ft to 25,000 ft. This is the largest of the restricted areas. It is primarily used for antenna pattern testing and flying qualities testing such as spins and flight controls. Many of the flights conducted within this area involve chase operations with multiple aircraft participating.
- R4007 — Operating altitudes are surface to 5,000 ft. The NAS Patuxent River airfield lies within R4007. This area is seldom used for testing because it is within the Airport Radar Service Area of the airfield. Use of the restricted area for test purposes would effectively close the airport. The airspace within the restricted area is normally used by radar and tower control zones for airfield operations, i.e., takeoffs/landings. Clearance to fly through the airspace is granted by the Air Route Traffic Control Center (ARTCC). Aircraft depart and arrive on instrument departures/arrivals as well as VFR. Access to the R4005 and R4006 areas are from this area.

The V-22 may fly out of this local area and testing complex, and would fly in accordance with FAA requirements, but these flights would not normally involve testing profiles.

The V-22 aircraft are fueled by truck within restricted areas. The fueling is done through the Rotary Wing Aircraft Test Directorate (RWATD), and fuel allocations for the V-22 are included with the RWATD totals. The RWATD used 15,456,000 gallons of JP-5 and 838,000 gallons of JP-4 and JP-8 during January through October, 1994 (Lewis, 1994). Typical usage by the V-22 is given for the following months: about 12,000 gallons in June, 4,400 gallons in July, 8,350 gallons in August, and 12,890 gallons of JP-5 in September 1994 (Brown, 1994).

2.2 ALTERNATIVE LOCATIONS

The use of an alternative location to conduct testing of the V-22 during EMD and LRIP was considered, but eliminated from further evaluation. NAWC AD Patuxent River has been specifically designated for Navy flight test missions, and hosts the test equipment, laboratories and other facilities, and trained personnel needed to conduct flight test missions. Other test facilities may conduct some specific tests, but are not equipped for the full range of flight tests.

The best candidate for an alternative test location is Edwards Air Force Base (AFB), California. Edwards AFB's primary mission is to conduct flight testing for the Air Force. The base has the equipment and facilities that would be needed to conduct most V-22 flight test missions. The following paragraphs briefly discuss Edwards AFB operations and environmental areas of concern, and the reasons why Edwards AFB has been eliminated from further discussion.

Edwards Air Force Base is located in the High Desert area, approximately 60 mi (96 km) northeast of Los Angeles. The base covers 301,000 acres, the majority of which are located in Kern County. Small portions of the base are located in Los Angeles and San Bernardino Counties. The nearest city is Lancaster, about 10 miles to the south of the base.

Edwards AFB is home of the Air Force Flight Test Center (AFFTC), which conducts developmental and follow on testing of new and modified military aircraft. This includes manned and unmanned aircraft and related avionics flight-control and weapon systems. Any aircraft with a requirement to operate out of Edwards AFB on any type of support mission, regardless of agency or project being supported, must contact the AFFTC/XR for approval and assignment of a sponsor or project officer (DMA, 1994a).

There are 21 runways, ranging in length from 4,000 to 39,000 feet. In addition to the main runways, Edwards AFB contains large runway complexes (Rogers Lakebed) that are available for flight test use during most of the year.

Relocation to Edwards AFB would likely involve minor modifications of the new host facilities, and construction of a ground run stand specifically for use with the V-22. Although a facility review would be conducted before specific needs could be identified, Edwards AFB is a large facility. Edwards AFB would not require new construction or operation of instrumented ranges or telemetry stations. Support facilities for the V-22 may need to be modified, and fueling and other support activities would increase at Edwards AFB as a result of the program.

The numbers of personnel assigned to Edwards AFB would increase if the V-22 program were relocated to the base. About 150 to 300 personnel, primarily contractor personnel, could be moved to Edwards AFB during the test and evaluation period. Existing Edwards AFB personnel would assume some of the

test functions. In particular, some of the support personnel would already be in place to support the V-22 program.

If the alternative site of Edwards AFB were selected for flight tests of the V-22, there would be changes at both Edwards AFB and NAWC AD Patuxent River. Some of the V-22 unique test and support personnel working the V-22 program at NAWC AD Patuxent River would need to be stationed at Edwards AFB, while others would remain at NAWC AD Patuxent River. The effort and costs of establishing a V-22 test team and facilities at Edwards AFB would be extensive, and would have an associated schedule risk.

A brief consideration of the environmental impacts of conducting the V-22 testing at Edwards AFB also identifies two environmental areas of concern, air quality and water resources. Edwards AFB is in non-attainment for ozone (O_3) and PM_{10} (particulate matter smaller than 10 microns in diameter). Water supplies are very limited, and the water requirements for operations and for support personnel who would live in the area may have significant impacts (U.S. Geological Survey, 1987).

A detailed consideration of the environmental impacts of using Edwards AFB could be made if it were cost-effective to relocate the V-22 program, or if significant environmental impacts precluded the use of NAWC AD Patuxent River for the V-22 program. However, the effort and costs of establishing a comparable test team and test facilities at Edwards AFB would be prohibitive. Adverse environmental impacts from relocating the V-22 test program to Edwards AFB are also likely to occur in the areas of air quality and water resources. Therefore, the use of Edwards AFB as an alternative location for the V-22 testing would not be a reasonable alternative, and will not be further evaluated in this document.

2.3 NO ACTION ALTERNATIVE

The no action alternative constitutes no further testing of the V-22 at NAWC AD Patuxent River. Under this alternative, no additional aircraft would be acquired, and aircraft #3 would not be further tested under the ITT concept. The basic V-22 would be unserviceable without the tests, and production of the aircraft could not continue.

This would still leave a mission need for improved airframes, increased payloads, ranges and speeds, improved communications and navigational abilities, and other improved operational capabilities. The V-22 has been selected as the best alternative to meet the mission need.

2.4 REASONABLY FORESEEABLE CUMULATIVE ACTIONS

The impacts of the V-22 program would be cumulative with other present and reasonably foreseeable future actions. New activities that could have cumulative

effects would include the relocation of Navy personnel and construction activities resulting from the 1991 and 1993 decisions of the Commission on Base Realignment and Closure (BRAC), and other test programs.

The current construction of facilities, to support the relocation of additional major research and engineering functions to NAWC AD Patuxent River, was directed by the 1991 BRAC. The 1993 BRAC Commission specified another realignment of NAWC AD Patuxent River. This action is the subject of an environmental impact statement (EIS), and involves relocating about 2,800 Navy personnel and activities to NAWC AD Patuxent River (USN, 1994b). Construction would occur from 1995 through 1997. New projects include a NAVAIR Headquarters, a propulsion system evaluation facility, expansion of the child development center, widening of Buse Road, and a fuel pipeline extension.

The action would occur concurrently with other testing, training and flying missions at the NAS Patuxent River. New actions would include a 1995 follow-on test program for the T-45A aircraft. The T-45A action is being evaluated in a separate EA (USN, 1995).

Other foreseeable actions in the area of the NAS Patuxent River include new and expanded public schools in St. Mary's, Calvert, and Charles Counties, various highway improvements (including MD Highways 235, MD 237, and MD 246), mobility and safety enhancement projects that could improve access to and from NAS Patuxent River, and housing developments in nearby areas (USN, 1994c).

2.5 SUMMARY OF POTENTIAL IMPACTS

Based on discussions with Navy personnel, federal and state agencies, and comparisons with similar military activities, several areas of potential concern associated with the V-22 program have been identified. Table 2.5-1 summarizes the potential impact to the public and environment from implementing the action at NAWC AD Patuxent River. Impacts of discontinuing the V-22 program, without bringing a replacement program to NAS Patuxent River, are summarized for no action. If a replacement program was located at NAS Patuxent River, the potential environmental impacts would likely be similar to those resulting from the proposed action.

The intensity of the impact can be *significant* or *insignificant*. The criteria used to define the intensity of impacts is discussed in each resource section in Chapter 4. Impacts are typically adverse, but *beneficial* effects can result if the action measurably improves the current condition. If a resource is unlikely to be affected, *no impact* is specified.

Table 2.5-1
Summary of Potential Impacts for the V-22 Program

Area of Impact	Proposed Action	No Action
Aircraft Operations/Safety	Insignificant	Insignificant
Air Resources	Insignificant	Insignificant
Biological Resources	Insignificant *	Insignificant *
Cultural Resources	No Impact	No Impact
Hazardous Materials and Waste	Insignificant	Insignificant
Noise and Land Use	Insignificant	Insignificant
Socioeconomics	Insignificant	Insignificant
Water Resources	Insignificant	Insignificant

* Insignificant with the use of mitigation measures specified in Section 4.3.4.

CHAPTER 3
AFFECTED ENVIRONMENT

3 AFFECTED ENVIRONMENT

This chapter describes the human environment, providing baseline information to allow the evaluation of potential environmental impacts which could result from the proposed action and the no action alternative. As stated in 40 CFR §1508.14, the human environment potentially affected is interpreted to include the natural and physical resources and the relationship of people to those resources. The approach to defining the environmental baseline was to identify potential issues and concerns of the proposed action and alternative; from this information, the relevant resources are described.

Geological resources are not described in this assessment because there would be no major construction projects or earth moving activities associated with the proposed action. No chaff or other materials would be released at the NAS Patuxent River or surrounding environment. Planned construction projects include the ground run stand, which is to be built within the bounds of the airfield, and the VESTL facility, which is programmed for approximately 5,000 square feet within 100 feet of Hangar 109 (the area is currently a parking lot). The geology in both areas is unconsolidated, and the soils have been previously disturbed during construction of the airfield, and the parking lot. The construction plans would include requirements to minimize runoff and sedimentation. The minimal area disturbed, the shallow depth of excavation, and the fact that construction would occur in a previously disturbed area precludes the need for describing and assessing impacts to geological resources.

Visual resources are not described in this document, because changes would be minimal. The only change to the existing visual environment at NAWC AD Patuxent River would be the construction of the ground run stand, and the replacement of a portion of a parking lot with a building. The difference in height, and the perceived visual impact, of a taxiing aircraft versus one on a ground run stand would be negligible. The VESTL facility would be adjacent to Hangar 109, a multi-story structure that dominates the area, and would not be noticeable from many perspectives. Because many different types of aircraft are operating at NAWC AD Patuxent River, no adverse visual impacts regarding flights of the V-22 would be evident.

The transportation infrastructure is not described in this document, because changes would be minimal. No new roads are required, nor is there a significant proportion of installation traffic attributable to personnel associated with the V-22 program. Consequently, the existing road network is not described in this document.

The resource areas which may be impacted by the proposed action and no action alternatives and are described are aircraft operations and safety, air resources,

biological resources, cultural resources, hazardous materials and wastes, noise and land use, and socioeconomics.

3.0.1 History of NAS Patuxent River

In September 1941, a Bureau of Aeronautics committee was formed to select a site where the five existing Navy aircraft test facilities could be consolidated. Cedar Point, Maryland, was chosen, and groundbreaking ceremonies were conducted in April, 1942. The Station was commissioned in April, 1943 as NAS Patuxent River. In June, 1945, the Naval Air Test Center (NATC) was established to coordinate the test function previously performed by NAS Patuxent River. The Station assumed the functions of logistics and administrative support to the test center. Since commissioning, NATC/NAS Patuxent River has played a major role in naval aviation history. The first U.S. jet-powered aircraft was tested and evaluated here. Problems in rocket and bomb dropping were also solved, and techniques for fleet use were developed. In addition, radar fire control, radar tracking, field lighting, and instrument landing techniques were extensively tested and developed.

3.0.2 Current Mission of NAWC AD Patuxent River

The NAWC AD stood up at Patuxent River on January 1, 1992. The NAWC AD Patuxent River is a field activity of the Naval Air Systems Command, and is the lead Naval Air Warfare Center Aircraft Division site with responsibility for support of the Aircraft Division Headquarters. The NAWC AD is a full spectrum research, development, test and evaluation, engineering, and fleet support center for air platforms. The NAWC AD supports products throughout their life-cycle, providing fleet customers and sponsors with quality service.

3.1 AIRCRAFT OPERATIONS AND SAFETY

The NAS Patuxent River has three primary runways (6-24, 13-31, and 2-20) and one secondary runway (9-27). Runway 9-27 is designated a primary taxiway and secondary runway to be used during VFR daylight operations only. This runway is used for less than one percent of all operations.

All aircraft (fighter, attack, helicopters, surveillance, etc.) within the USN inventory are flown at NAS Patuxent River and share the same airspace. In addition, other DoD aircraft (e.g., A-10, F-16, C-5, and C-141) use the airfield for touch-and-go operations.

The following sections briefly describe the operational environment, airspace used for flight testing, and flight safety.

3.1.1 Aircraft Operations

Due to the NAWC AD Patuxent River's research and test mission, flight operations consist primarily of resident air traffic which occurs on weekdays from 8 a.m. to 4 p.m. Ninety-five percent of the total annual air operations are conducted during daylight hours, with peak operational activity in mid-morning and mid-afternoon (Orr, 1994). On weekends, the air traffic is usually limited to transient aircraft such as C-141 and C-5 aircraft being operated by Air Force Reserves.

Aircraft which currently support the test mission at NAS Patuxent River include the T-45A, V-22, F/A-18, A-4, T-2, T-34, T-38, U-1, U-21, U-6, KC-130, AV-8B, UH-60, and X-26. Other transient aircraft that support the test mission include the P-3, S-3, and E-2.

Operations managed by the tower at NAS Patuxent River have decreased approximately 10 percent from FY 92 to FY 94. In the first 9 months of FY 94, there were 3,171 completed, non-rotary operations conducted by NAWC AD aircraft. All fixed wing aircraft plan operations through the scheduling office. Rotary aircraft, including the V-22, can bypass the scheduling office and plan operations through the tower if a local pattern is performed. Current V-22 operations comprise approximately 1 percent of all operations, and 5 to 8 percent of rotary operations within the NAS Patuxent River airspace (Berg, 1994).

3.1.2 Airspace

Test airspace covers 50,000 square miles and includes over water supersonic areas. Dedicated test areas can be expanded by prearranged use of Virginia Capes, Cherry Point, and Charleston operating areas. The NAWC AD Patuxent River has priority use of the airspace and can schedule project use for non-NAWC AD aircraft (Orr, 1995). The V-22 flight test missions would be flown within local tower traffic patterns and restricted areas R4002/R4005/R4006/R4007, currently used by NAWC AD Patuxent River. This airspace is shown in Figure 2.1-4.

3.1.3 Flight Safety

To ensure the safety of personnel and the public and to avoid loss of property around installations, the Navy implements safety considerations in all areas of flying operations. Instruction 3750 is an emergency plan prepared for responding to aircraft accidents. At the squadron level, Instruction 3750 is amended with attachments and appendices to tailor the plan for the squadron mission.

The Navy classifies mishaps into three categories—Class A, Class B, and Class C. A Class A mishap results in a total cost in excess of $1 million for injury, occupational illness, and property damage; a fatality or permanent total disability; or destruction or damage beyond economical repair to Navy aircraft. A Class B

mishap results in total cost in excess of $200,000 (but less than $1 million) in property damage; permanent partial disability; or three lost workdays. A Class C mishap results in excess of $10,000 (but less than $200,000), or an injury or occupational illness which results in a loss of worker productivity greater than 8 hours (but less than three days).

3.1.4 Accident Potential Zones

The intent of an AICUZ Plan is to facilitate the development of compatible land uses in the vicinity of military air installations. The AICUZ Plan incorporates noise contours and accident potential zones (APZ) developed using number and type of air operations and aircraft mix, into planning zones. These zones include the clear zone (CZ), APZ-I, and APZ-II, with the CZs being the most restrictive and APZ-II the least. The APZs are shown in Figure 3.1-1.

APZ-I is the area within a boundary line 820 feet from the centerline, and parallel to the runway on either side and extending out from the end of each runway 3,000 feet within the standard approach fan (NAVFACENGCOM P-272 Airfield Safety Criteria). The standard approach fan starts 200 feet from the end of the runway, at a point 750 feet on either side of the centerline, and fans out at an angle of 7°-58'-11". The standard approach clearance area extends outward 50,000 feet, the outboard end is 15,500 feet wide, with the inboard end 1,500 feet wide. Zone I covers the first 3,000 feet from the end of the runways. APZ-I is the same for all runways at NAS Patuxent River regardless of frequency of use.

APZ-II is based on an average annual number of operations (86,200 per year). Runway utilization is presently 68 percent on runway 6-24, 28 percent on 13-31, and 4 percent on 2-20. Accident history at NAS Patuxent River shows no significant number or pattern of crashes within the approach fans of the runways.

Overall Navy accident analysis indicates that considerable accident potential lies outside APZ-I within the standard approach fan to the 10,000-foot limit at many major airfields. At NAS Patuxent River, the concentration of approximately 58,600 operations on runway 6-24, and 24,100 on 13-31, greatly reinforces the designation of a significant APZ beyond the 3,000 foot APZ-I limit. Therefore, APZ-II is established for runways 6-24 and 13-31 within the approach fan beyond APZ-I. An APZ-II is not established for runway 2-20 due to low utilization.

3.1.5 Impact Hazards

Bird strikes can cause aircraft to crash, and are a hazard to low-level flight operations throughout the continental United States. The greatest potential for impacts occur in migratory corridors and in areas where birds congregate for foraging or resting.

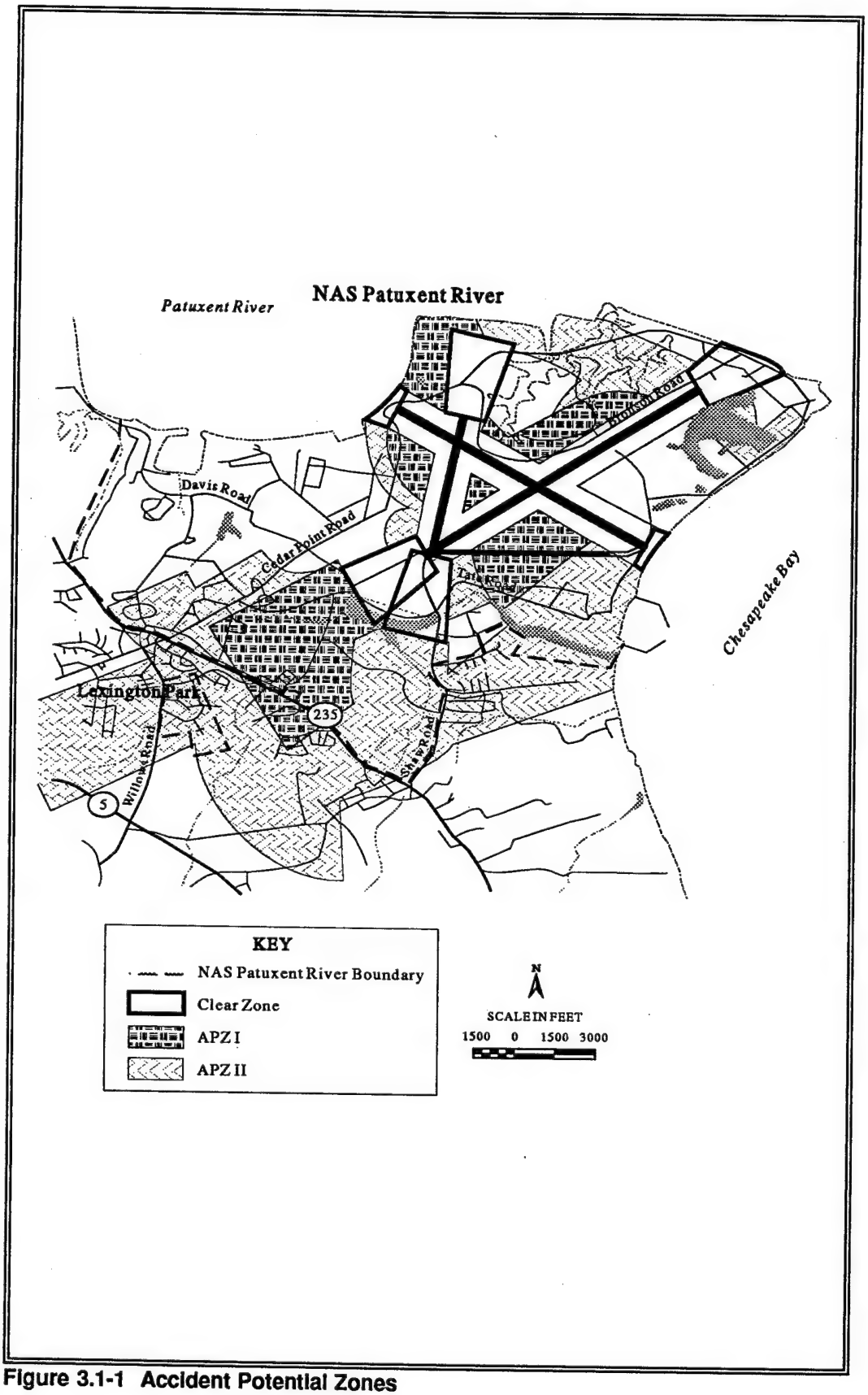

Figure 3.1-1 Accident Potential Zones

The Chesapeake Bay is within the Atlantic flyway, which is a major migratory path for waterfowl. Waterfowl generally pose a greater threat to aircraft than most birds, due to their abundance, greater size, and habits (e.g., flying in flocks). Migrations occur in the spring and fall, but exact timing of the migration depends upon the species of bird and weather conditions. Most species migrate during the night, but some species (e.g., hawks, eagles, pelicans and some ducks and geese) migrate during the day.

Most birds (95 percent) migrate at altitudes below 10,000 feet Above Ground Level (AGL). Most of those birds migrate at 3,000 feet AGL or less. As expected, bird strike rates rise substantially as altitude decreases. Areas where high concentrations of birds are found (e.g., wildlife refuges) can also increase the potential for bird strikes. The U.S. Fish and Wildlife Service (USFWS) requests that pilots maintain a minimum altitude of 2,000 feet AGL while flying over wildlife refuges. There are two wildlife refuges and several wildlife management areas within the bounds of the special use airspace in which the V-22 would operate (See Figure 3.3-1).

Deer also present an aircraft impact hazard at NAS Patuxent River. The wetlands adjacent to the runways are the greatest hazard because deer frequent the area during sunset. Two mishaps occurred in 1994: a class B mishap occurred when an F/A-18 and a deer impacted, and an F-14 also collided with a deer (Orr, 1994). Controlled farming (planting of sorghum, an acidic plant) on the installation is being conducted to detract deer from the area. The hunting season has also been expanded to trim the population at the installation (Orr, 1994). Section 3.3.2 provides further information on deer at NAS Patuxent River.

Wildlife concerns include the potential for strikes with aircraft. For example, the white-tailed deer poses a significant threat of damage or injury to personnel if struck by an aircraft (or a vehicle). Consequently, the NAS Patuxent River maintains a management plan to keep white-tailed deer populations at acceptable levels. The level is balanced between the probability of having one or less deer/aircraft strikes per year, and still allowing for reasonable recreation, education, and aesthetic uses. Maintenance of unattractive deer habitat around the runways, and improving deer habitat quality in outlying areas has helped to reduce deer/aircraft strikes. Cutting vegetation near the flightline to levels between 6 and 12 inches also reduces the attraction for birds (Orr, 1995).

3.2 AIR RESOURCES

The air resources section describes the existing concentrations of various pollutants and the climatic and meteorological conditions (e.g., precipitation, wind direction and speed, and atmospheric stability) that influence the quality of air. The sources for data in this section include previous environmental impact statements and environmental assessments, publications on the potentially affected

area, climatological summaries, state air regulations, U.S. Environmental Protection Agency (USEPA) air regulations, and monitoring data.

3.2.1 Climate and Meteorology

The NAS Patuxent River is located on a peninsula bordered by the Patuxent River and Chesapeake Bay. The area has a humid subtropical type of climate, which is moderated by nearby water bodies.

The prevailing wind directions for NAS Patuxent River are northwesterly from October to April and southerly from May through September. The average annual windspeed is 6 knots, and the average monthly windspeeds range from 5 to 7 knots. Generally, there are calm winds at the NAS Patuxent River. Prevailing winds are more common during February, March, and April.

The mean annual temperature for NAS Patuxent River is 58°F. The coldest month is January with a mean temperature of 37°F; the warmest month is July with a mean of 78°F. The extreme temperatures range from 103°F to -3°F. July and August have five or more days with maximum temperatures greater than or equal to 90°F. More than half of the days in December through February have mean minimum temperatures less than or equal to 30°F.

The NAS Patuxent River is located in a humid portion of the country, where the mean annual precipitation is approximately 40.5 inches, including an average of 15 inches of snow. The monthly distribution of precipitation is fairly uniform during the year. The wettest month is July (which averages 4.6 inches of precipitation during an average of 10 days), and the driest months are February and April (which average 2.8 inches of precipitation over 9 or 10 days). The annual average relative humidity at 4:00 a.m. is 78 percent and at 1:00 p.m. is 59 percent.

3.2.2 Regional Air Quality

Air quality in Maryland is defined with respect to conformity to the National Ambient Air Quality Standards (NAAQS) that have been established by the USEPA pursuant to the Clean Air Act (CAA), as amended. Maryland Ambient Air Quality Standards (MAAQS) are the same as the NAAQS (Code of Maryland Regulations, Title 26, Subtitle 11 Air Quality). The NAAQS define pollutant concentrations that may not be exceeded in a given time period in order to protect human health (primary standard) and welfare (secondary standard), with a reasonable margin of safety. These standards, listed in Table 3.2-1, include maximum concentrations of criteria pollutants. Criteria pollutants are ozone (O_3), carbon monoxide (CO), nitrogen dioxide (NO_x), sulfur dioxide (SO_x), lead (Pb), and particulate matter with a diameter of 10 microns or less (PM_{10}). All of the criteria pollutants, with the exception of ozone, are primary pollutants released during industrial operations.

Standards are not to be exceeded more than once per year, except for O_3 and PM_{10}, which are not to be exceeded more than an average of one day per year. Exceeding a concentration level is a violation and constitutes a non-attainment of air quality standards. Areas not meeting ambient air quality standards are designated as being in non-attainment for the specific pollutant causing the violation.

Table 3.2-1
National and Maryland Ambient Air Quality Standards

Pollutant	Unit	Averaging Time	Primary[a]	Secondary[b]
O_3	$\mu g/m^3$	1 hr	235	same
CO	$\mu g/m^3$	1 hr 8 hr	40,000 10,000	same same
NO_x	$\mu g/m^3$	AAM[c]	100	same
SO_x	$\mu g/m^3$	3 hr 24 hr AAM	none 365 80	1,300 same same
PM_{10}	$\mu g/m^3$	24 hr AAM	150 50	same same
Pb	$\mu g/m^3$	¼ year	1.5	same

a National Primary Standards establish the level of air quality necessary to protect the public health from any known or anticipated adverse effects of a pollutant, allowing a margin of safety to protect sensitive members of the population.
b National Secondary Standards establish the level of air quality necessary to protect the public welfare by preventing injury to agricultural crops and livestock, deterioration of materials and property, and adverse impact on the environment.
c Annual Arithmetic Mean.

The USEPA and Maryland Department of the Environment (MDE) classify Maryland air quality control areas as attainment or non-attainment. Attainment areas have air quality better than or equal to the MAAQS. Non-attainment areas have air quality that is worse than the MAAQS. NAS Patuxent River is in Area V, which is comprised of Calvert, Charles, and St. Mary's Counties. According to 1994 data, Calvert and Charles County are in non-attainment for ozone; St. Mary's County is in attainment for all criteria air pollutants (Nardolillo, 1995).

Naval facilities and operations are required to comply with all applicable substantive and administrative requirements for air pollution control as required by the 1990 amendments to the CAA, the 1993 Conformity Rule, and all applicable air quality regulations enacted by Maryland. The Navy is also required to provide state and local agencies with the assurance that the proposed activities will not affect the area's ambient air quality classification when applying for air

permits for major air pollution sources. All pollutants from major point sources at NAS Patuxent River are permitted and included in the Maryland air emissions inventory. Minor sources are exempt from permit requirements, but were reviewed as required by the General Conformity Rule for Charles and Calvert Counties, which are in non-attainment for ozone. The requirements of this Rule do not apply for the proposed action in St. Mary's County, which is in attainment for all criteria pollutants.

Recent draft guidance (review copies distributed March 1995) issued by the Chief of Naval Operations (CNO), titled "Draft CNO Interim Guidance on Compliance with the Clean Air Act and General Conformity Rule", pertains to consideration of emissions in non-attainment areas, even if an installation is not in a non-attainment zone. The guidance requires accounting for employee trips originating in nonattainment areas, as well as emissions from low-level flight (defined as total emissions up to the inversion layer) operations in nonattainment areas.

Prevention of Significant Deterioration (PSD) regulations (40 CFR 52.21) define air quality levels that cannot be exceeded by major stationary emission sources in specified geographic areas. Major stationary sources are usually sources that emit more than 100 tons per year of a specific pollutant. The PSD regulations establish limits on the amounts of SO^2 and total suspended particles that may be emitted, above a premeasured amount, in each of the class areas. Class I areas are pristine areas, and include national parks and wilderness areas. All other areas in the United States are Class II areas, where moderate, well-controlled industrial growth could be permitted. There are no PSD areas within 50 miles of NAS Patuxent River.

3.2.3 Criteria Pollutant Emissions

Criteria pollutants may originate directly or indirectly from diverse mobile and stationary sources. While ozone is a regulated criteria pollutant, it is not directly emitted from sources. Ozone forms as a result of volatile organic compounds (VOCs) and oxides of nitrogen reacting with sunlight in the atmosphere.

Ozone depleting substances (ODSs) are substances that may cause or contribute to degradation of the earth's stratospheric ozone layer. Stratospheric (upper atmospheric layer) ozone protects health by screening unwanted ultraviolet emissions from the sun. Stratospheric ozone should not be confused with tropospheric (lower atmospheric layer) ozone, which is regulated by the NAAQS standard and can be harmful to human health. ODSs are listed under Section 602 of the CAA, which also specifies timeframes for the phase-out of ODSs.

Table 3-2.2 lists the estimated criteria pollutant emission rates from current activities at the NAS Patuxent River. Additionally, it provides estimated air emission information on VOCs (which are precursors to tropospheric ozone), particulates, which contribute to reduced visibility and health problems, and

hazardous air pollutants, which may result in an increase in mortality, serious irreversible illness, or incapacitating reversible illness.

Table 3.2-2
Summary of Estimated Air Emissions, NAS Patuxent River, Maryland[a]

Source Type	Particulate	PM_{10}	SOx	NOx	VOC	CO	HAP[b]	Totals
Total Stationary Sources:	1.9	3.1	13.4	42.4	26.9	10.8	3.7	102.2
Total Mobile Sources:	0.2	0.0	0.1	88.2	56.2	303.5	0.00	448.2
Total All Sources:	2.1	3.1	13.5	130.6	83.1	314.3	3.7	550.4

[a] All figures are in tons per year.
[b] Hazardous Air Pollutants

Source: AESO, 1994

The principal emissions from mobile sources includes exhaust from jet engines, gas turbines, and related motors, ground support equipment (GSE) and fugitive VOC emissions due to fuel transfer from trucks to GSE. The Navy is working with the MDE to assess the impacts of these emissions relative to the state's permitting criteria. The proposed action and associated fuel handling equipment would be designed to comply with air quality regulations.

Current flight operations average approximately 4,600 fixed wing aircraft operations per month at NAS Patuxent River. Other mobile sources of criteria pollutants include GSE and employee and government vehicles. Stationary sources of criteria pollutants include vehicle maintenance activities, heat plant emissions, and refueling operations.

Toxic air pollutants (TAPs) or hazardous air pollutants (HAPs) are typically generated during maintenance and operations from the use of various compounds (e.g., for cleaning, etching, or painting). High VOCs, chlorofluorocarbons (CFCs) and other stratospheric ozone depleting substances have also been commonly used in aircraft operations and maintenance, but are being increasingly regulated and replaced. The V-22 program includes efforts to reduce or eliminate these air pollutants, and includes contract requirements to incorporate material changes (USN, 1994a).

3.2.4 Sensitive Receptors

Sensitive populations are more susceptible to the effects of air pollution than are the population at large. Sensitive receptors include long-term health care facilities, rehabilitation centers, convalescent centers, retirement homes, residences, schools, playgrounds, child care centers, and athletic facilities. Receptors in proximity to localized sources of toxins and carbon monoxide are of particular concern. There are some sensitive receptors (e.g., schools, a chapel, and child care centers) in the town of Lexington Park; the nearest is over one mile from the runway complex. On NAS Patuxent River, the chapel, hospital, and child care center are all over one mile from the proposed ground run stand (approximately 7,000, 8,000, and 9,000 feet respectively). The proposed construction of the VESTL facility on the southwest corner of Hangar 109 is approximately 5,000, 6,500, and 7,000 feet respectively from the chapel, hospital, and child care center.

3.3 BIOLOGICAL RESOURCES

Biological resources include native and introduced plants and animals, and the aquatic habitat in the region around NAS Patuxent River. The NAS Patuxent River is made up of grasslands, woodlands, water areas, marshes, agricultural lands, and developed areas. Most of the general information is tiered from the previous environmental analysis (USN, 1994b). The biological resources section is separated into three areas for discussion: vegetation, wildlife, and threatened or endangered (T&E) species.

3.3.1 Vegetation

Patuxent River is located within the Upper Coastal Plain, occupying a broad headland known as Cedar Point. This point consists of the southern shore of the Patuxent River and its confluence, and part of the western shore of Chesapeake Bay. The undeveloped areas include about 1,850 acres of forested areas, 225 acres of wetlands, 400 acres of open waters, 500 acres of agricultural areas, and over 1,060 acres of other types of wildlife areas.

Forested areas include both pine and hardwood species, while developed areas are mostly hardwood. The mowed grassy areas in the developed areas are usually composed of cinquefoil, clovers, plantain, various grasses, asters, and other weed species. These species are typical of areas that are well maintained and adjacent to buildings, roads or roadsides. Vegetation in the agricultural areas is typically wheat, barley, rye, sorghum, soybean, corn, and clover.

The dominant vegetation of the marshes and ponds varies from the cord grass and widgeongrass of the saltmarshes, to the flatsedges, bulrushes, cattails, spatterdock, and watermilfoil of the freshwater marshes and ponds.

The estuaries and salt marshes are located in three areas: the Harper and Pearson Creeks north of the major runways and at the confluence of the Patuxent River, Goose Creek located east of the runways and southwest of Cedar Point, and Pine Hill Run located near the southeastern boundary of NAS Patuxent River. The freshwater wetlands are scattered along the major and minor drainages of NAS Patuxent River. The open water ponds are located within the drainages along the southern boundary.

3.3.2 Wildlife

There are approximately 50 species of mammals that may occur on NAS Patuxent River, most of which are common to abundant. Most of these species require forested areas or an aquatic area such as a lake, stream or marsh.

Mammals are of concern to NAWC AD Patuxent River test programs primarily because they pose a potential for strikes with aircraft. Large animals, such as the white-tailed deer, pose a significant threat of damage or injury to personnel if struck by an aircraft. Consequently, the NAS Patuxent River maintains a management plan (see Section 3.1.5) to keep white-tailed deer populations at acceptable levels, and away from runways and operational areas. Other smaller mammals are less mobile and less likely to be found in active operational areas.

Birds are more likely than mammals to be disturbed as a result of aircraft test activities. Birds are of particular concern at NAS Patuxent River, in part because the Station is located within the Atlantic Flyway (which results in greatly increased numbers of birds during migratory seasons). In autumn, birds from the east and northeast follow the Atlantic coast to the south. Most of the birds come from the plains of north-central Canada, traverse the Great Lakes area, fly to Pennsylvania, and then towards the Atlantic Ocean. The birds winter along the coast, mainly on the Delaware and Chesapeake Bays. The spring and winter bird migrations retrace the same routes with slight differences. Certain areas, such as Bloodworth Island, must be avoided during the migration and overwintering periods. The restrictions of airspace R-4002 close the area from November to March, to aircraft operations from the surface to 3,000 feet above sea level (ASL).

Other areas, such as the Martin National Wildlife Refuge and Blackwater National Wildlife Refuge, also have airspace restrictions. The refuges are located within airspace R-4006. Airspace R-4006 requires a minimum 3,500 foot overflight (DMA, 1994b). Numerous wildlife management areas are also found within the airspace around NAS Patuxent River. These areas are not as restricted to the extent of wildlife refuges, but generally identify areas of high wildlife concentrations.

3.3.3 Threatened or Endangered Species

The Endangered Species Act (ESA) requires that any action authorized by a federal agency shall not jeopardize the continued existence of a T&E species or result in the destruction or adverse modification of designated critical habitat of such species. A listed species, provided protection under the ESA, is so designated because of danger of its extinction as a consequence of economic growth and development without adequate concern and conservation. Previous coordination with the Maryland Natural Heritage Program and the USFWS (USN, 1994b) has determined that five federally-listed species may exist on or near NAS Patuxent River. The five species include two birds (peregrine falcon and bald eagle), two beetles (northeastern beach tiger beetle and puritan tiger beetle), and the dwarf wedge mussel. The bird and beetle species are discussed below, but since the proposed and no action alternatives would not impact the mussel, it will not be discussed further.

The peregrine falcon (*Falco peregrinus*), an endangered species that has been observed in the Chesapeake Bay area during its spring and fall migrations. Peregrine falcons migrate during daylight hours, usually between 2,100 and 3,500 feet (Heintzelman, 1986). This falcon primarily feeds on other birds, ranging from swallows to large ducks, and generally nests on high, remote cliff ledges. In urban areas, the peregrine falcon has used bridges and high-rise buildings as nest sites.

The bald eagle (*Haliaeetus leucocephalus*) has been a protected species in the United States since the establishment of the Bald Eagle Protection Act in 1940. Bald eagles are now listed as a threatened species. Bald eagle numbers have increased in the Chesapeake Bay area during recent years; in 1990 there were 225 breeding pairs and an average of 1.4 fledged eaglets per active nest. In addition to resident bald eagles, there are winter migrants from Canada and summer migrants from Florida. While no bald eagle nests have been sighted at NAS Patuxent River, each spring a nesting survey is conducted within the land-based and aerial operations of NAS Patuxent River. In 1992, the survey had five encounters with bald eagles and identified two nests within a mile of Patuxent River. In 1993, a third nest was confirmed to be approximately one mile from Patuxent River. No changes were found in the 1994 survey (USN, 1994b). These nest sites are shown in Figure 3.3-1. The bald eagle usually migrates during daylight hours at an altitude of about 1,300 feet (Heintzelman, 1986).

The northern beach tiger beetle (*Cicindela dorsalis dorsalis*) is federally-listed as a threatened species. This tiger beetle occurs at ten locations in Virginia and Maryland, including four sites in Calvert County. One location is the Patuxent River beaches across from the NAS Patuxent River (see Figure 3.3-1). This beetle is very susceptible to activities on the beach that disturb or compact the sand. A 1989 USFWS survey for the northern beach tiger beetle found one adult east of Fishing Point. This single occurrence was thought to be from Drum Point. The

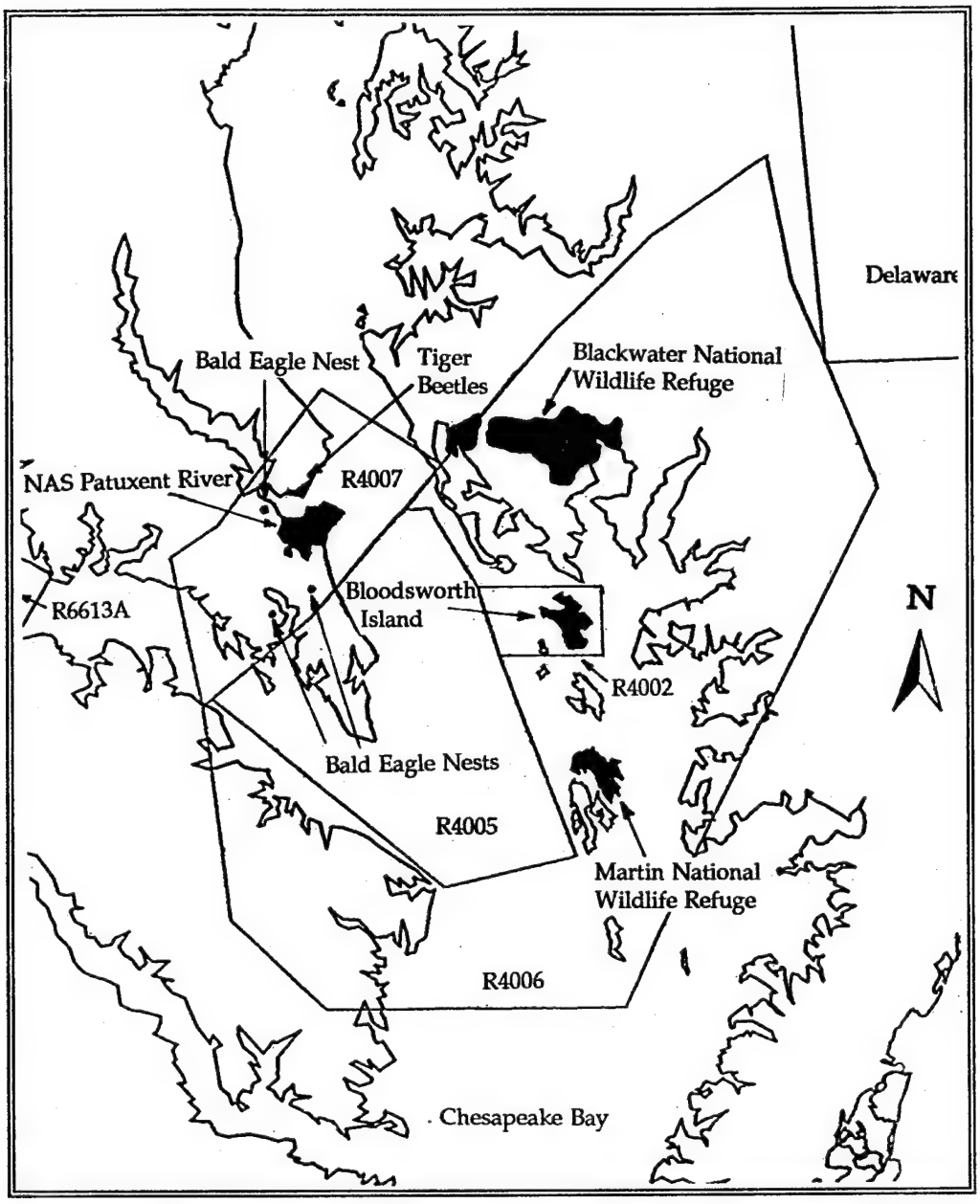

Figure 3.3-1 Locations of T&E Species and Restricted Fly Zones

habitat of Patuxent River was found not to be conducive to supporting the northern beach tiger beetle (USN, 1994b).

The puritan tiger beetle is federally-listed as a threatened species. Most populations occur on high, gradually eroding earthen cliff faces and beaches of Calvert County. There are about ten locations in Calvert County that are known for this species. The loss of beaches below the cliffs from erosion or development, and modification of the cliffs, are the principal causes of endangerment. No specimens have been found at NAS Patuxent River.

The State of Maryland also maintains a state program listing plant and animal species of special concern. The state program is run by the Maryland Natural Heritage Program, within the Maryland Department of Natural Resources (MDNR). There are four protected species that have been identified at NAS Patuxent River and that may be affected by the proposed or no action alternatives.

The northern harrier (*Circus cyaneus*) is listed as rare by the MDNR. Although the northern harrier is fairly common in the United States, harrier numbers are declining in Maryland. The northern harrier is fairly common on the Station between fall and spring. The last northern harrier nesting occurred at the Station in 1980 (USN, 1994b).

The least tern (*Sterna antillarum*) has an active nesting colony located at NAS Patuxent River, which may be the only remaining colony in this area of the Chesapeake Bay (Rambo, 1994).

Two protected plant species, sand plain flax (*Linum intercursum*) and St. John's-wort (*Hypericum gymnanthum*), have also been found on the Station.

3.4 CULTURAL RESOURCES

Cultural resources are archeological and historical items, places, or events considered important to a culture, community, tradition, religion, or science. Archeological and historic resources are locations where human activity measurably altered the earth or left deposits of physical or biological remains. Prehistoric examples include arrowheads, rock scatterings, or village remains. Historic resources generally include campsites, roads, fences, homesteads, trails, and battlegrounds. Architectural examples of historic resources include bridges, buildings, canals and other structures of historic or aesthetic value.

The Navy developed a Cultural Resources Survey and Resource Management Plan to meet the responsibilities and requirements mandated by the National Historic Preservation Act and the Archaeological Resources Protection Act. The plan was developed under the guidance of the Maryland Historical Trust and the State Historic Preservation Officer (SHPO). Between 1981 and 1983, the Navy sponsored a series of surveys that uncovered 46 archaeological sites. Other surveys have located 30 standing historic structures, 12 structural remains, and have placed one site (Mattapany-Sewell) on the National Register of Historic Places (NRHP) (USN, 1994b).

3.4.1 Archeological and Historic Resources

Before European settlement of the southern Maryland area in the early 1600's, the region was inhabited by the Mattapient and Patuxent Indians. The first Europeans were missionaries from Spain. Settlers in the original Maryland colony landed at the mouth of the St. Mary's River in 1634 and established St. Mary's City. The

region developed as a hub for trade and commerce. The area was heavily influenced by the Revolutionary War, the War of 1812, and the Civil War. After the Civil War, the area was primarily agricultural. In the late 19th century, the first industry came to the area. At the beginning of World War II, the Naval Station (now NAWC AD) was established at Patuxent River.

The NAS Patuxent River is closely associated with the early history of Maryland. European settlers had homes and estates, some of which have remains on the Navy property and are described herein. The Somerville House was built by an early settler around 1780-1790. The Mattapany mansion was built in about 1722, and had additions constructed about 1850. The mansion took its name from the area called Mattapient by the Patuxent Indians, who inhabited this region of Maryland when European settlers arrived. The estate is located on the site of a Jesuit mission erected soon after the settlement of St. Mary's City. Mattapany-Sewell, listed on the NRHP, is a seventeenth century homesite built in the vicinity of an earlier Jesuit mission by Charles Calvert, the third Lord Baltimore. The base chapel, built in the 1920s, is located on the site of the original St. Nicholas Parish church, constructed in 1795 by the Jesuit missionaries.

3.5 HAZARDOUS MATERIALS AND WASTES

This section discusses hazardous material, hazardous waste, solid waste and wastewater management programs, and the IRP, which may be impacted by the V-22 program at NAWC AD Patuxent River. All programs are managed in accordance with applicable federal, state, local, DoD, and Navy regulations, standards, and laws that apply to the installation. The Hazardous Material Management & Control (HMM&C) Program Office and the Public Works Department are responsible for managing most components of these programs. Hazardous materials, hazardous wastes, solid wastes, and wastewater are defined by regulatory guidance; this section uses the regulatory definitions to identify the types of materials and wastes.

3.5.1 Hazardous Materials Management

Hazardous materials are defined within certain laws to have specific meanings. For this document, substances identified as hazardous by OSHA are considered hazardous materials. Examples of hazardous materials are fuels, solvents, cleaning agents, paints and other coatings. Hazardous materials, including normal aircraft and support equipment oils, but excluding fuels, are received and distributed at the NAS Patuxent River through the Hazardous Material Reutilization Center (HAZMART). All users obtain needed hazardous materials from the center. The center monitors product shelflife, and also tracks all hazardous materials from "cradle to the grave." Fuels and fuel oils are handled through the bulk fuel storage area.

The EMD and LRIP phase would involve the use of numerous hazardous materials. The hazardous materials would primarily include materials commonly used to operate aircraft at the NAWC AD Patuxent River. Major (depot) maintenance would not be conducted at the NAWC AD Patuxent River.

Fuels, which are hazardous materials because of their flammable or explosive properties, are received in the bulk fuel storage area by barge and trucked to designated fueling locations. The NAWC AD Patuxent River used about 1,600,000 gallons of jet fuel (including JP-4, JP-5, and JP-8) per month during 1994 (Lewis, 1994). In 1994, both V-22s used an average of 4,700 gallons of jet fuel per month (Brookins, 1994).

The Station has an Oil and Hazardous Substance Spill Contingency Plan that is reviewed and updated annually. Under this plan, the Commanding Officer, through the Navy On-Scene Commander, is responsible for contingency planning and spill preparedness at the NAS Patuxent River. Trained Initial Response and On-Scene Response Teams provide initial and follow up containment and clean-up of spills. The Supply Officer ensures that contractors delivering or removing oil and hazardous substances to or from the Station conform to the Federal Water Pollution Control Act.

A Pollution Prevention Plan is currently being prepared for the entire NAS Patuxent River. The plan will include hazardous material and hazardous waste reduction programs, as well as reporting requirements under EPCRA. The final plan is projected to be completed by October 1995 (Crittendon, 1995). The ITT has developed ITT Procedures (ITTPs) for managing Hazardous/Regulated Waste (ITTP 4.13), Hazardous Materials (ITTP 4.14), and Oil and Hazardous Substance Spill Contingencies (ITTP 4.3). These procedures reference the corresponding NASPAXRIVINSTs (Brown, 1995). The V-22 program office has also completed a specific Pollution Prevention Plan for the V-22. This plan specifically identifies materials and processes that can be changed in the V-22 program. The plan addresses reducing hazardous materials within the design of the V-22, and by the procedures used in support of the V-22 (Kim, 1995).

Some of the hazardous materials used under the V-22 program include lubricants, hydraulic oils, isopropyl alcohol, solvents, naphtha, MEK, etchants, and sealants (V-22 ITT Hangar 109 Authorized Use List, 1995). These hazardous materials are already handled at the facility, and amounts are tracked through an automated tracking system.

In addition to the NAWC AD Pollution Prevention Program and the V-22 Program Pollution Prevention Program, the Joint Contractors for the V-22 Program have been actively pursuing company-wide Chemical Reduction Programs for several years. Bell Helicopters Textron, and Boeing Defense & Space Group, Helicopters Division participated in the EPA's Voluntary 33/50 Program, which targeted 17 chemicals believed by the EPA to be the worst pollutants. Bell and Boeing have

also been targeting sources of VOCs used in materials required to manufacture and support their products.

3.5.2 Hazardous Waste Management

The use of hazardous materials can, in turn, create hazardous wastes. Hazardous wastes, as defined for this document, include those substances identified by RCRA, CERCLA, and SARA, and subsequent amendments and definitions. These substances would include, for example, used solvents or paint wastes. The total amount of hazardous waste manifested by the NAWC AD Patuxent River to off-site facilities in 1994 was about 178 tons (Crittendon, 1995). In 1994, the V-22 program at NAWC AD Patuxent River generated approximately 1.2 tons of hazardous waste (Crittendon, 1995).

The responsibility for managing hazardous wastes at the NAWC AD Patuxent River starts with the generating organization. Each organization appoints accumulation point managers and alternates to provide for the proper training, identification, handling, storage, and recordkeeping of hazardous waste. The generating organizations are also responsible for having the wastes transported off Station to a RCRA-permitted facility. The facility, a Defense Reutilization and Marketing Office at Fort Meade, Maryland, disposes of the wastes (Brown, 1995).

3.5.3 Solid Waste Management

Most Station activities generate solid waste. Solid waste generated at the NAS Patuxent River is managed by a maintenance contractor, who oversees the Station landfill. This landfill is limited to the disposal of rubble, construction debris or oil-contaminated soils (USN, undated). Other solid waste is taken to the St. Mary's County Landfill. The Station sends about 5,000 tons per year (tpy) to the county landfill, but amounts have been reduced as a result of a recently instituted recycling program (USN, 1994b).

3.5.4 Wastewater Management

NAS Patuxent River sends approximately 0.8 million gallons per day (mgd) of wastewater to the Pine Hill Run wastewater treatment plant (WWTP), a municipal WWTP located offbase. Peak flow events, generally associated with heavy rainfall, can range from 1.0 to 1.1 mgd. The WWTP operates under MDE permit number MD0021679 and has a capacity of about 4.5 mgd. The NAS Patuxent River is permitted to use up to 1.25 mgd (USN, 1994a).

3.5.5 Installation Restoration Program (IRP)

Past activities at the NAS Patuxent River have contributed to soil, surface water and groundwater contamination. The Navy is actively pursuing a program to address and, as necessary, remediate environmental concerns created by these past

practices. The IRP is the basis for environmental response actions on DoD installations. The IRP at NAS Patuxent River includes 32 hazardous waste sites that are being investigated.

3.6 NOISE AND LAND USE

Sounds that disrupt normal activities or otherwise diminish the quality of the environment are designated as noise. Noise can be stationary or transient, intermittent or continuous. The study area, as it pertains to noise effects and land use, includes NAWC AD Patuxent River and the surrounding area within a one-mile radius of the base boundary. This study area includes the community of Lexington Park. Other communities outside of the area currently affected by established noise impact guidelines, but which could be affected by the proposed action include the communities of California, Hermanville, Great Mills, and St. Mary's City in St. Mary's County; Drum Point and Solomon's in Calvert County; Crapo and Crocheron, Andrews, Hoopersville, Wingate, Toddville, and Elliot in Dorchester County; and Tyaskin, Wetipquin, Athol, Mardela Springs, Bivalve, Sharptown, Hebron and Salisbury in Wicomico County.

3.6.1 Noise Descriptors

Community response to noise is not based on a single event, but on a series of events over the day. Factors that have been found to affect the subjective assessment of the daily noise environment include the noise levels of individual events, the number of events per day, and the time of day at which the events occur. Most environmental descriptors of noise are based on these three factors, although they may differ considerably in the manner in which the factors are taken into account.

A decibel (dB) is the physical unit commonly used to describe sound levels. Sound measurement is further refined by using an "A-weighted" decibel (dBA) scale which emphasizes the audio frequency response curve audible to the human ear. Thus, the dBA measurement more closely describes how a person perceives sound. Figure 3.6-1 provides a range of sound level values in dBA for common sounds and for typical environments.

Construction noise is normally measured over an 8-hour time period, using the equivalent sound level (L_{eq}). The L_{eq} is obtained by averaging dBA sound levels over a selected time period. Another descriptor of a noise environment over extended periods of hours or days is the day-night average sound level (L_{dn}). To compute an L_{dn}, single noise events are measured using an A-weighted scale with corrections added for the number of events and the time of day. A 10-dB penalty is added for noise that occurs between the hours of 10 p.m. and 7 a.m. because nighttime noise events are considered more annoying than noise occurring during daytime. The L_{dn} descriptor is accepted by federal agencies as a standard for estimating noise impact and establishing guidelines for compatible land uses. The

Navy has adopted the L_{dn} as the measure for noise regulations.

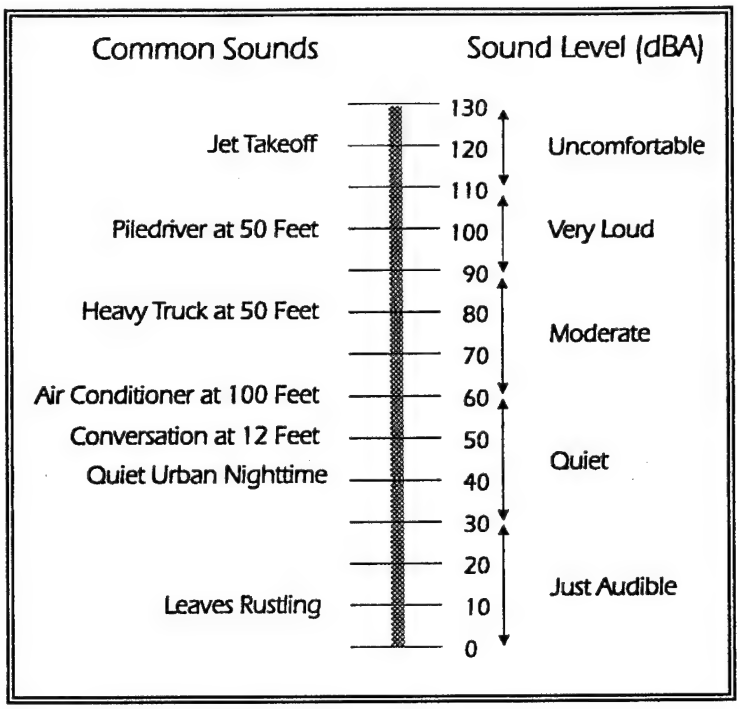

Figure 3.6-1 Typical Noise Levels

The Sound Exposure Level (SEL) is a single event measure of the amount of noise energy from a source normalized to one second of time. Measurements of SEL tend to be higher than single peak measurements because the energy is compressed into the one-second time period. An SEL is a combination of level and duration. Thus, SEL values would generally diminish with increased altitude of a V-22 and distance from the receptor. Noise generated near the ground generally attenuates six dB for each doubling of distance from a noise source; trees and terrain would further increase attenuation. Noise generated further above ground (above 50 feet) generally attenuates about two dB for every doubling of distance.

3.6.2 Existing Noise Conditions

The V-22 aircraft, because of its rotary configuration, creates different noise patterns. The "helicopter" mode used during takeoff and landing generates high noise levels (comparable to a UH-1 (Huey) helicopter), while inflight noise is comparable to a twin engine propeller plane. These noises fall within a broad range of "transient" noises, which arrive and depart in a finite period of time. Dependent primarily on the type of aircraft, type of operations, and distance from the observer to the aircraft, the maximum fly-over noise levels vary widely in magnitude. The noise can range from levels undetectable in the presence of other background noise, to levels sufficiently high to create feelings of annoyance or to interfere with speech or sleep. The duration of the noise would also vary depending on the proximity of the aircraft, speed, and orientation with respect to the observer.

The evaluation of aircraft noise requires descriptions of the noise associated with individual aircraft fly-overs (operations), and also of the cumulative effect of a number of operations over some period of time. Noise generated by aircraft operations is analyzed through a comprehensive set of computer routines for

calculating noise exposure contours for airfield operations. Necessary data for noise analysis include aircraft type, engine type, altitude, airspeed, power setting, flight tracks, number of operations (per flight track) made by each aircraft, the time of day of the operations, and engine run-up and ground maintenance tests. From these data, a set of contours is produced, indicating the noise zones (NZs) around an airfield. The results are expressed in L_{dn} using dBA as the units and presented in contours of 5-dBA increments from 60 L_{dn} to greater than 80 L_{dn}.

The number of daily aircraft operations directly affect the level of noise in the vicinity of NAWC AD Patuxent River. Currently, the operations that occur at NAWC AD Patuxent River include flights by the F-18, A-4, P-3, T-2, T-38, U-1 and small numbers of a variety of other aircraft and helicopters. About 97.6 percent of all operations occur during the day, with only 2.4 percent occurring at night (10 p.m. to 7 a.m.). Helicopters account for about 20 percent of all operations, with 99.8 percent of these operations occurring during the day.

Other sources of noise in the vicinity of NAS Patuxent River include vehicular traffic, construction, and noise generated from maintenance equipment. Vehicular noise sources include traffic using State Routes 235 and 712. Except for aircraft operations that cause noise levels in excess of 80 dBA, other noise levels on-base range from 50-70 L_{dn}.

3.6.3 Air Installation Compatible Use Zone

The AICUZ program was developed to monitor the effects of aircraft noise and accidents on communities near military installations. In the interest of protecting local citizens from noise exposure and accident potential, coupled with the need to maintain operational capabilities of the base, AICUZ designates the CZ, APZs (see Sections 3.1.3 and 3.1.4), and NZs, and provides land use compatibility recommendations. A report on the AICUZ for the base is made available to the general public and surrounding communities to use as a planning tool. A draft AICUZ study for NAS Patuxent River was completed in 1979, with updates to the contours in 1984 (USN, 1994a). The resulting NZs (contours) are shown in Figure 3.6-2. L_{dn} noise levels above 75 are confined to NAWC AD Patuxent River and a small area of Chesapeake Bay. Parts of Lexington Park and Hermanville are within the 60 to 65 and 65 to 70 L_{dn} contours.

The Federal Interagency Committee on Urban Noise (FICUN) has defined guidelines for considering noise in land use planning. The guidelines consider areas with noise levels of 75 L_{dn} or greater as unacceptable living environments. Areas between 65-75 L_{dn} are recommended as "generally unacceptable" for noise sensitive land uses such as residences, schools, hospitals, and public services. In the outdoor noise environment, levels greater than 65 L_{dn} may be annoying to some people during communications. Commercial/retail businesses are a compatible land use without restrictions up to 70 dBA, and up to 80 dBA provided that noise reduction levels of 25-30 dB are achieved for public areas.

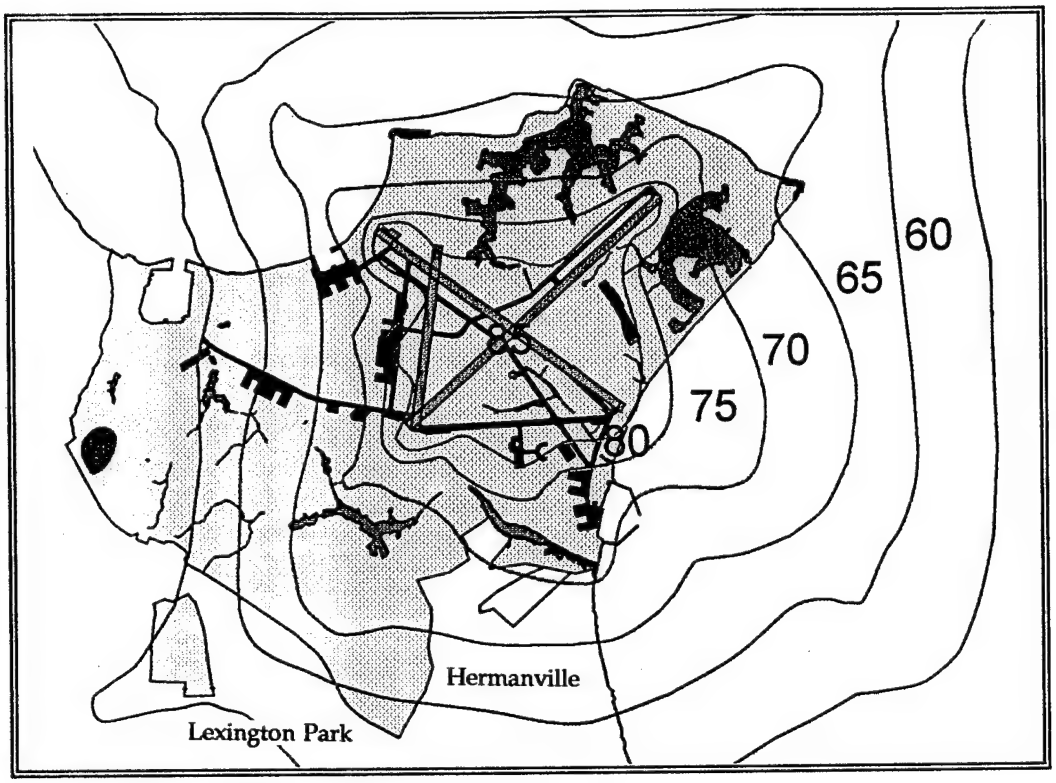

Figure 3.6-2 AICUZ Noise Contours

Industrial/manufacturing, transportation, and utility companies have a high noise level compatibility, and thus, can be located within the higher noise zones without the same restrictions that apply to housing and commercial/retail use.

3.7 SOCIOECONOMICS

Socioeconomic resources are described in this section using demographic and employment measures. These elements are the key factors influencing housing demand, education needs, and infrastructure requirements.

3.7.1 Location and Region of Influence

NAS Patuxent River is located in St. Mary's County, Maryland, a relatively rural county approximately 65 miles southeast of the Washington, DC area. St. Mary's County is the southernmost county on Maryland's Western Shore, with the Patuxent River and Chesapeake Bay to the east and the Potomac River to the west (see Figure 3.7-1). St. Mary's County is considered part of the Tri-County Area of Southern Maryland, comprising Charles, Calvert, and St. Mary's Counties. Charles and Calvert Counties, but not St. Mary's County, are part of the Baltimore

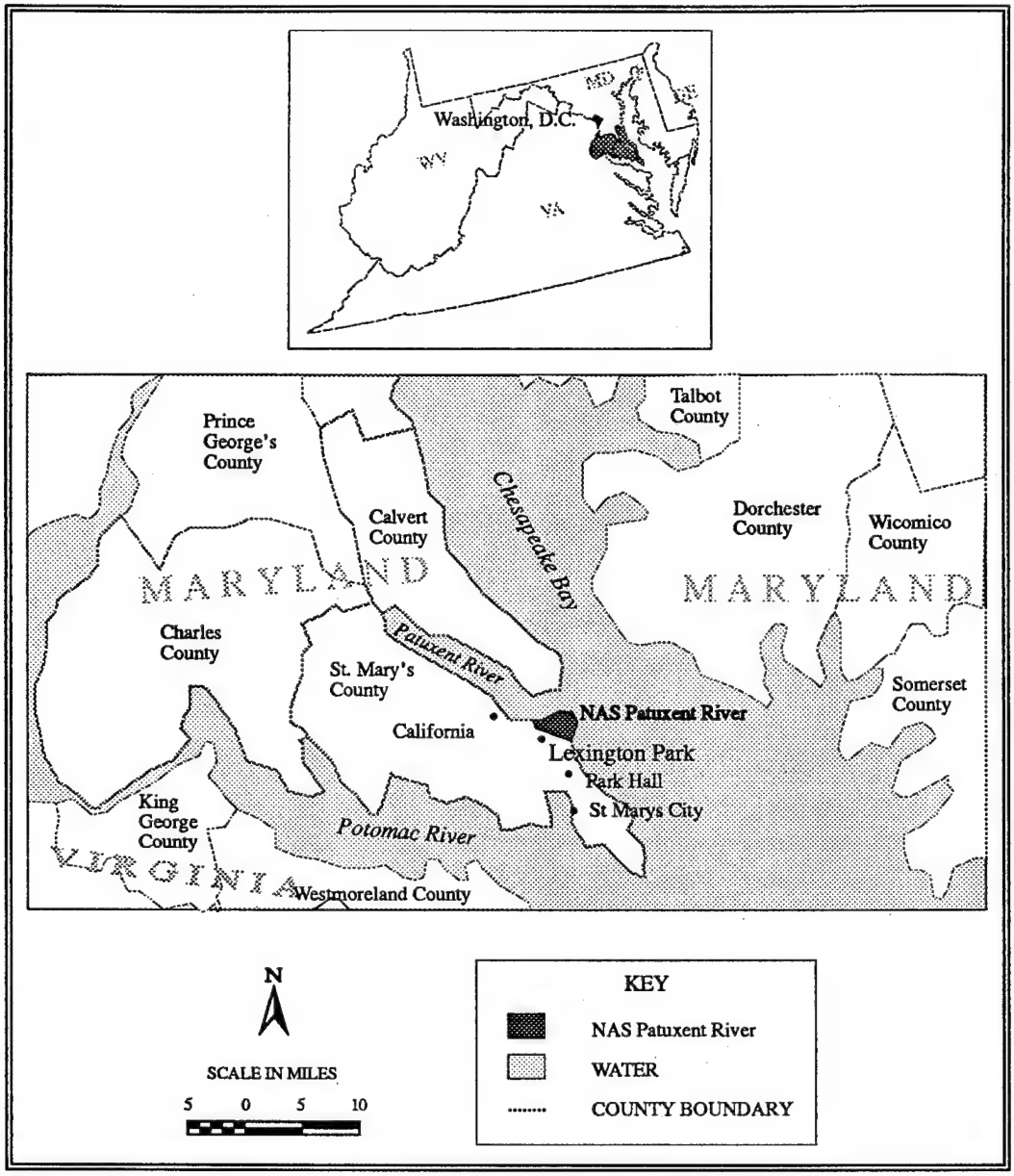

Figure 3.7-1 NAS Patuxent River Region of Influence

Primary Metropolitan Statistical Area (MSA), which in turn is part of the Washington, DC Consolidated MSA.[1]

[1]Metropolitan Statistical Areas (MSAs) are regions having a high degree of economic interdependence. These regions consist of a central city and some or all of its surrounding counties. Typically, a large proportion of residents in these surrounding counties will work or shop in the central city or its suburbs. Consolidated MSAs (CMSAs) are grouped adjacent PMSAs; CMSAs are "mega" metropolitan areas such as the greater Washington, DC area or the greater New York City area.

The socioeconomic region of influence (ROI) for this analysis is defined by the residence patterns of NAS Patuxent River personnel and by the number of incoming personnel. Because more than 89 percent of these personnel live within St. Mary's County, and because the number of incoming personnel is estimated to be relatively small, St. Mary's County is defined as the ROI.

3.7.2 Population Characteristics

The population of St. Mary's County in 1992 was approximately 79,600, representing one-third of the Tri-County Area population. The County's population grew by about 27 percent during the 1980s, compared to 37 percent for the Tri-County Area and 14 percent for the State of Maryland. The average annual growth rate for the County during this period was 2.4 percent.

As noted above, approximately 89 percent of NAS Patuxent River personnel reside in St. Mary's County, with about half of those located in Lexington Park, Park Hall, California, and Hollywood. Six percent of the remaining personnel live in Calvert County, two percent in Charles County, and the remainder in other areas (USN, 1994b).

3.7.3 Employment and Income

Key indices for measuring the economic strength of a given market include the number of individuals employed, employment growth, economic diversification, the rate of unemployment, and per capita income. This section discusses characteristics and growth patterns of St. Mary's County employment and income.

3.7.3.1 Area Employment

Total 1992 employment in St. Mary's County was approximately 35,600, constituting 37 percent of the employment of the Tri-County Area. St. Mary's County experienced a 65 percent increase in employment between 1980 and 1992, compared to 82 percent for the Tri-County Area and 32 percent for the State of Maryland. The average annual growth rate for the County during this period was 5.1 percent.

St. Mary's County has a high proportion of employment in the government sector, which accounts for one-third of all employment. Of these government employees, one-third are military personnel, nearly 40 percent are federal civil service, and the remainder work for state or local government. As illustrated in Figure 3.7-2, services and retail are the other major employment sectors. Construction provides only 7 percent of all jobs in the county, while the remaining sectors are even smaller.

Table 3.7-1 shows measures of economic diversification and stability for St. Mary's County, the Tri-County Area, and the State of Maryland. Economic sector

diversification indices are used to measure the extent to which a county or region is diversified relative to the United States as a whole, with the implication being that more diverse economies are typically able to withstand and adjust to economic fluctuations. Diversification values range from 0.0 to 1.0. A value of 1.0 indicates that a local economy is highly diversified, with an employment mix identical to that of the United States. Correspondingly, lower index values show that a local economy has employment in fewer economic sectors, and thus may be more subject to impact if changes occur within those sectors. Generally, the larger and more urbanized a region, the more diversified the economy.

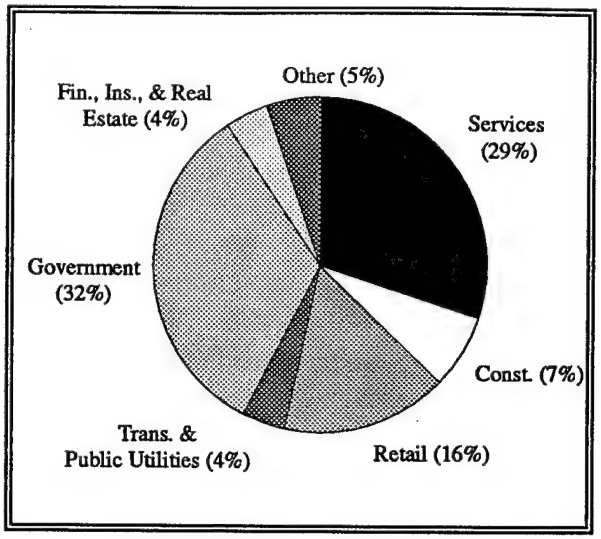

Figure 3.7-2 St. Mary's County Employment by Industry, 1990

Unemployment for St. Mary's County averaged 5.6 percent in 1991 and 4.6 percent in 1990, while the State averages were 5.8 and 4.7 percent, respectively. (US Bureau of Labor Statistics, 1991).

Table 3.7-1
Economic Fluctuation and Diversification Measures

Area	1990 Diversity Index	1990 Sector of Maximum Employment	1992 Employment	Largest One-Year Employment Increase, 1980-1992	
				Number	% over Previous Year
St. Mary's County	0.5037	Government	35,570	2,912	9.9
Tri-County Area	0.6379	Services	96,134	7,507	10.0
State of Maryland	0.8967	Services	2.7 Mil	101,082	4.3

Source: U.S. Bureau of Economic Analysis, 1994

3.7.3.2 NAS Patuxent River Employment

NAS Patuxent River is one of the largest employers in the area, employing approximately 9,000 persons, which represents one-fourth of St. Mary's County employment. An additional 3,000 private contractor personnel who support

various USN operations at NAS Patuxent River are employed in the local area (USN, 1994b).

3.7.3.3 Income

Total personal income in St. Mary's County was $1.25 billion in 1990, yielding a per capita income (PCI) of approximately $16,300, roughly 87 percent of the United States average PCI and 74 percent of the Maryland average (US Bureau of Economic Analysis, 1992).

3.7.4 Housing Characteristics

3.7.4.1 On-Base Housing

NAS Patuxent River had 815 military personnel residing in base housing as of December 1993. There is a waiting list of one to three months for officer housing and six to twelve months for enlisted housing (USN, 1994b).

3.7.4.2 Off-Base Housing Market

According to the 1990 Census, there are nearly 28,000 year-round housing units in St. Mary's County. Approximately 64 percent of the units are owner-occupied; approximately 8.5 percent of the total units are vacant. These vacancy rates represent more than 2,300 available housing units (U.S. Bureau of the Census, 1990).

Housing costs in the St. Mary's County area, while less expensive than the nearby Washington, DC metropolitan area, are still somewhat higher than in many parts of the United States. The median value for a home is $108,300, while median rent is $539 per month (US Bureau of the Census, 1990).

3.7.5 Schools

Public schools in St. Mary's County are administered by a county-wide independent school district under the Maryland Department of Education, funded by county general revenues. St. Mary's County has 16 elementary, four middle, and three high schools, with a total enrollment of almost 13,000 in the 1993-94 school year. Expansion projects are underway at one high school and two elementary schools, including Park Hall Elementary, which serves many NAS Patuxent River dependents.

3.8 WATER RESOURCES

Water resources include surface waters and groundwater. Water resources can be described by quantity and quality, drainage conditions, and subsurface movements. While the hydrologic cycle naturally transports water through various media such

as the atmosphere, the ground surface and subsurface soils, human activities can impact water resources.

3.8.1 Surface Water

Surface water at NAS Patuxent River consists of a few small streams, and six manmade ponds which range in size from 2 acres to 28 acres. These ponds intercept runoff from higher elevations on the installation.

The southern and western areas of NAS Patuxent River are hilly and steep (greater than 15 percent slope in some areas, and a maximum elevation of 120 feet above MSL) as compared to the northern areas (slopes are less than 5 percent, and a maximum elevation is about 40 feet above MSL). Runoff in the southern and western areas typically flows from southwest to northeast. The northern and eastern portions of NAS Patuxent River are divided into two major drainage areas, which form on either side of Runway 6-24. Drainage to the north and west of the runway flows towards the Patuxent River, while drainage to the south and east flows towards the Chesapeake Bay.

The Patuxent River is designated as one of Maryland's Scenic Rivers. This classification is designed to preserve and protect the natural values of the river.

3.8.2 Groundwater

The Aquia and Piney Point-Nanjemoy aquifers are the major sources of groundwater for the Tri-County area. Present total water consumption is approximately 20 million gallons per day (mgd).

Water levels in the Aquia aquifer have steadily declined since 1952. The most significant water level declines occurred in the Lexington Park area, and near Cove Point and Prince Frederick in Calvert County. From 1991 to 1993, water levels near Lexington Park continued to decline, while levels at the NAS Patuxent River showed slight increases. The general declines in water levels are attributed to increasing domestic and industrial groundwater pumping (USN, 1994b).

Water levels in the Piney Point-Nanjemoy aquifer show a similar history to the water levels of the Aquia aquifer. Because the Piney-Point Nanjemoy aquifer was relatively shallow, and many of the early wells flowed without pumping, use of this aquifer attracted many people (USN, 1994b).

The Piney Point-Nanjemoy aquifer is about 200 feet below MSL, and the Aquia aquifer is about 500 feet below MSL, at the NAS Patuxent River. The NAS Patuxent River uses approximately 0.9 mgd of water drawn from 24 wells, primarily in the Aquia aquifer (USN, 1994b). The current peak demand is 1.1 mgd and will increase as more facilities are brought online from the realignment occurring at NAS Patuxent River. The distribution infrastructure includes fifteen

ground storage tanks, 3 elevated storage tanks, and 31 miles of mains. The system capacity is 5.6 mgd per day, and the current water distribution system is adequate.

3.8.3 Water Quality

Water quality can be influenced by discharges (including stormwater and wastewater), seepage, and natural conditions. This subsection describes the general quality of the surface water and groundwater in the vicinity, and identifies stormwater and wastewater contributions from NAS Patuxent River.

MDE divides the Patuxent River into eight water quality segments, only one of which (Segment 01) is adjacent to NAWC AD Patuxent River. Segment 01 varies in water quality from fair (water quality is characterized by intermittent severe degradation or by continued low level degradation) to good (water quality generally supports designated uses or meets water quality goals).

The quality of the groundwater supply for NAS Patuxent River is characterized as good (USN, 1994b).

NAS Patuxent River sends approximately 0.8 mgd of wastewater to the Pine Hill Run WWTP, a municipal WWTP located offbase. Peak flow events, generally associated with heavy rainfall, can range from 1.0 to 1.1 mgd. The WWTP operates under MDE permit number MD0021679 and has a capacity of approximately 4.5 mgd. The NAS Patuxent River is permitted to use up to 1.25 mgd (USN, 1994b).

Stormwater drainage from NAS Patuxent River flows through a gravity discharge system consisting of more than 87,000 feet of reinforced concrete sewer line (USN, 1994b). The drainage system operates under the NPDES, permit number MD 0020150. Substances of concern identified in some of the outfalls include mainly fuel, oil, and grease.

CHAPTER 4
ENVIRONMENTAL CONSEQUENCES

4 ENVIRONMENTAL CONSEQUENCES

This chapter discusses the potential for significant impacts to the human environment at NAWC AD Patuxent River as a result of implementation of the proposed V-22 program. As defined in 40 CFR §1508.14, the human environment is interpreted to include natural and physical resources, and the relationship of people with those resources. Accordingly, this analysis of the V-22 program has focused on identifying types of impacts and estimating their potential significance. This chapter discusses the changes in operations at NAWC AD Patuxent River, and the effects that the proposed action or alternative could generate in environmental and socioeconomic resource areas, previously described in Chapter 3.

The concept of "significance" used in this assessment includes consideration of both the context and the intensity or severity of the impact, as defined by 40 CFR §1508.27. Severity of an impact could be based on the magnitude of change, the likelihood of change, the potential for violation of laws or regulations, the context of the impact (both spatial and temporal), degrees of adverse effect to specific concerns such as public health or endangered species, and the resilience of the resource. The criteria used to differentiate between significant and insignificant impacts are introduced at the beginning of each resource section. If a resource would not be affected by a proposed activity, a finding of no impact was declared. If a resource would be measurably improved by a proposed activity, a beneficial impact was noted.

For this EA, the evaluation of potential environmental effects compares a maximum impact condition to a baseline condition. The baseline condition includes all ongoing activities at NAWC AD Patuxent River, including V-22 activities. The baseline year is 1994, when the maximum number of V-22 operations (about 100 operations per month) occurred at NAWC AD Patuxent River. The predicted maximum impact condition would likely occur in 1997 or 1998, when the maximum number of V-22 operations would take place (about 250 operations per month). This analysis therefore compares the impact of projected 1997 or 1998 operations to the 1994 baseline. Other impacts, such as construction of the ground run stand and the VESTL, will be evaluated as separate events in addition to the comparison of the baseline and maximum impact years.

The no action alternative would result in the cessation of the V-22 program at NAWC AD Patuxent River. Consequently, impacts are assessed relative to the 1994 baseline.

Adverse impacts can be mitigated through avoidance, minimization, remediation, reduction, or compensation. The proposed measures that NAWC AD Patuxent River would take to mitigate adverse impacts are identified, and other potential measures of mitigation are suggested within each resource section.

The V-22 program would proceed with other ongoing and future programs at NAWC AD Patuxent River. The additive effect of the actions could result in cumulative impacts to the biological, physical, and socioeconomic environment in the region of influence. The significance of the individual impacts of the proposed action, when considered collectively with the potential impacts of other actions, may change. Section 4.9 discusses the unavoidable adverse effects associated with the proposed action and cumulative impacts at NAWC AD Patuxent River.

Irreversible and irretrievable commitments of resources, as part of the proposed V-22 program, are presented in Section 4.10.

4.1 AIRCRAFT OPERATIONS AND SAFETY

Potential operational impacts of continuing with the V-22 program or conducting no action (stopping the V-22 program at NAWC AD, Patuxent River) were assessed. Under the proposed action, aircraft operations would peak during 1997. The proportion of V-22 operations to NAWC AD, Patuxent River operations is minimal (approximately 1 percent), and is projected to increase negligibly through 1998. Consequently, the peak operational level would result in an insignificant impact relative to operations, airspace use, and flight safety. For the no action alternative, the cessation of the V-22 program would insignificantly reduce aircraft operations, with a resulting reduction in airspace use and a decreased potential for accidents.

4.1.1 Analysis Methods

The impact of the proposed action was assessed by evaluating the anticipated changes in V-22 flight hours relative to baseline values in 1994. Operation information was provided from consultation with installation personnel, including contractors with the ITT.

Existing program and NEPA documentation provided information for the analysis of operational impacts. The predicted and the potential changes to operations, with concomitant impacts on airspace use and aircraft safety, were compared to significance criteria. Impacts caused by additional aircraft operations for the V-22 program are considered to be long-term because EMD flight operations are planned through April 1999, and LRIP operations would occur through 2000. Data presented in this section was also used in the evaluation of air quality and noise impacts.

The significance of potential impacts was assessed by evaluating the increase in aircraft activity. While a quantitative change in aircraft activity can be determined, it is not possible to assign quantitative significance criteria to such a change. Any increase in operations in an already congested airfield or airspace environment would be considered an adverse impact. A significant impact would

occur if the risk of an aircraft accident increased due to inadequate equipment or numbers of trained personnel. An increase in operations in a non-congested airfield or airspace environment would result in insignificant impacts, as long as adequate aircraft handling capabilities existed or were added to the Station. The significance of aircraft operational impacts to airspace and flight safety is dependent on the ability of NAWC AD Patuxent River to adapt to such a change through scheduling and amended safety procedures. A decrease in operations could result in a beneficial impact if the level of trained personnel, required equipment, and necessary facilities remained sufficient for the anticipated aircraft operations.

4.1.2 Potential Impact of the Proposed Action

4.1.2.1 Aircraft Operations

Average monthly operations for the V-22 program have initially decreased from 1994 to 1995, then are projected to increase and peak in 1997 to 1998. Operational flight hours for V-22 aircraft are projected to increase from 30 hours per month (two aircraft flown) in 1994, to 100 hours per month (five aircraft flown) in 1998. The monthly flight hours in 1998 were predicted by assuming that the five aircraft scheduled to be tested in 1998 (numbers 7 through 11) would each be flight tested 20 hours per month. The approximate flight time per plane in 1995 is planned for 1.5 hours per operation. Therefore, there would be approximately 66 V-22 flight operations per month in 1998.

The average number of daily operations scheduled through NAWC AD Patuxent River has decreased approximately 10 percent from FY 92 through FY 94. The number of all operations at NAWC AD Patuxent River is likely to increase. However, a conservative assumption is that a decrease could occur from FY 95 to FY 98, similar to the decrease from FY 92 to FY 94. If such a decrease were to occur, the proportion of V-22 operations (including an increased number of V-22 operations) to other aircraft operations would increase from about 1 to 2 percent. This increase in V-22 operations would represent a minimal proportional increase in the overall installation operations. If the number of total aircraft operations at NAWC AD Patuxent River remain constant or increase slightly, the increase in V-22 operations would have less of an impact on the capability of Air Traffic Control to manage aircraft operations. Therefore, no significant impacts to aircraft operations are projected.

4.1.2.2 Airspace

No new airspace would be required to support the V-22 program. The existing restricted areas (R4002/R4005/R4006/R4007), defined as controlled blocks of airspace, and local tower traffic patterns would be used by the V-22. The restricted airspace is currently used by the Navy for test flights by other aircraft.

Flight tests for earlier phases of the V-22 program have previously used this airspace.

The NAS Patuxent River Air Traffic Control maintains control of all aircraft in the airport traffic area, including the airspace, from the surface up to 3,000 feet. Through 1998, the proposed action would increase the number of V-22 flight hours in the airspace around NAS Patuxent River. The small increment of V-22 operations in the airspace versus total aircraft is minimal. The airspace is currently used for testing of a variety of aircraft, including the V-22. All airspace use is scheduled and a flight plan is filed by all aircraft users. The impact to airspace use would be insignificant because of the small proportion of V-22 use versus other aircraft and the current use of the airspace for testing aircraft.

4.1.2.3 Flight Safety

During the peak years of V-22 operations, and conservatively assuming that the number of total operations at NAWC AD Patuxent River stabilizes or increases slightly, an increased potential for accidents would occur in the vicinity of the airfield. While the potential for accidents would increase, the impact to flight safety would be insignificant because of NAWC AD Patuxent River's ability to handle the traffic through scheduling, additional trained personnel, and any additional necessary air and ground traffic control resources. If the number of total operations decreased, with an increase in V-22 operations, the impact to flight safety would also be insignificant.

4.1.2.4 Accident Potential Zones

The potential for accidents contributes to the establishment of restricted zones off the ends of the runways as discussed in Section 3.1.4. These zones are based on an analysis of Army, Navy, Air Force, and Marine Corps aircraft accident data (USN, 1976). The zones are not dependent on the amount of traffic at a particular airfield or type of aircraft, but on where accidents occur around the airfield. For this reason, there would be no change or alterations to the existing APZs arounnd NAS Patuxent River. Therefore, established safety and compatible use guidelines within these zones would not change.

4.1.2.5 Impact Hazards

Bird and deer strikes are impact hazards. As noted in Section 3.1.5, large numbers of waterfowl migrate through the Chesapeake Bay and Patuxent River area or are year-round residents. Most birds (95 percent) migrate at altitudes below 10,000 feet AGL. Most of those birds migrate at 3,000 feet AGL or less. As expected, bird strike rates rise substantially as altitude decreases. The greatest potential for bird/aircraft collisions is at night during waterfowl migration periods, when flights are below 1,500 feet AGL (USAF, 1987).. Most V-22 flight testing would be conducted during daytime hours; up to seven percent of the flights could

occur at night. Therefore, the risk of bird strikes is not considered significant. The potential for bird strikes can be reduced by avoiding areas of concentration such as lakes and marshes, or by adjusting the timing and altitude of lights during migratory and breeding seasons.

Areas where high concentrations of birds are found (e.g., wildlife refuges) can also increase the potential for bird strikes. The USFWS requests that pilots maintain a minimum altitude of 2,000 feet AGL while flying over wildlife refuges. There are two wildlife refuges and several wildlife management areas within the bounds of the special use airspace that the V-22 would use. Potential impacts from overflight of wildlife areas are insignificant, and discussed in Section 4.3.2.

Because the V-22 is a V/STOL aircraft, the potential for deer strikes is much less than for fixed wing aircraft. The V-22 will take-off and land in an essentially vertical fashion, thus minimizing the potential for deer to stray into the path of the aircraft. Consequently, insignificant impacts are predicted for deer-aircraft collisions as a result of the V-22 program.

4.1.3 Potential Impact of the No Action Alternative

Under this alternative, the V-22 program would cease operating at NAWC AD Patuxent River. Consequently, compared to the existing baseline, fewer operations would occur and the potential for accidents, aircraft-fauna impacts, and airspace use would be slightly reduced, and have an insignificant impact. If other aircraft are upgraded as a partial replacement for the V-22, and are tested at NAWC AD Patuxent River, impacts would be similar to or greater than those predicted for the proposed action. More replacement aircraft would be used in multiple tests, and for longer periods of time. Other aircraft would continue to use NAS Patuxent River and the associated airspace for testing, and Accident Potential Zones would not change under this alternative.

4.1.4 Mitigation Measures

No significant impacts from the V-22 testing have been identified. Therefore, no mitigation measures are presented other than established practices and policies. An enhanced awareness of the different type aircraft performing test flights around Patuxent River would be required by air traffic control to maintain the high level of safety associated with Navy operations. The proficiency of the air traffic control personnel and ground crews would continue to advance and adapt to aircraft operation changes through ongoing training programs.

Airspace restrictions during winter migration (Bloodsworth R4002 is closed from operations within the surface to 3,000 feet from November to March) help decrease the probability of bird-aircraft strikes. Another measure to reduce strikes has been to cut vegetation to levels between 6 and 12 inches to reduce the amount

of vegetation that would seed and attract birds (Orr, 1994). These current mitigations should continue.

4.2 AIR RESOURCES

Air quality impacts would occur as a result of construction (e.g., grading or paving) and operational (e.g., refueling and aircraft operation) activities associated with the proposed action. Construction-related impacts would occur over a period of about four months. Operational impacts would be intermittent, but would be long-term, lasting beyond 2000. Mobile sources would provide an insignificant impact on air quality due to the small incremental increase in these sources. The no action alternative would insignificantly reduce air emissions through the cessation of the V-22 program at NAWC AD Patuxent River. Based on the analyses described in this section, the impacts to air quality would be insignificant.

4.2.1 Analysis Methods

The assessment of potential impacts to air resources focused on emissions from construction of the ground run stand and the VESTL, emissions from operation of the V-22, and emissions from support operations for the V-22. Interviews with ITT and Public Works personnel and the use of V-22 program documents facilitated the identification of potential emissions from the V-22 and associated support and construction activities. Weather conditions and proximity to metropolitan areas and sensitive receptors were also considered.

Reference documents provided pollutant criteria and emission factors for construction dust, vehicles, aircraft, and support equipment. Construction equipment emissions factors were obtained from tables found in the South Coast Air Quality Management District (SCAQMD), California Environmental Quality Act Air Quality Handbook (SCAQMD, 1992) since it provides an up-to-date compilation of construction emission factors drawn from numerous USEPA sources of emission factors. Operational emission factors were obtained from operational emission estimates from the V-22 program. Worst-case factors were used to provide a conservative estimate of emissions. Changes in mobile sources, such as ground support equipment (GSE) and commuter traffic, were compared to baseline values.

The projected emissions were compared to existing ambient air quality. The effects of climatic conditions, existing air emission sources, and receptors, as described in Section 3.2.1, were also considered in the assessment. The assessed changes were then evaluated against the significance criteria to determine the potential impact of the action. The predicted emission levels were compared to allowable amounts to ensure the action conforms with state or federal implementation plans for air quality.

The significance of impacts to air quality is based on federal and state pollution regulations and standards. A significant impact would be a violation of the NAAQS or MAAQS (see Table 3.2-1). Excessive or frequent exposure of sensitive receptors to increased pollutant concentrations due to high emission rates or proximity to a source could also have a significant impact. Significant rates of emissions for some criteria pollutants are shown in Table 4.2-1. Any daily emissions that would exceed these thresholds are considered to be potentially significant. A beneficial impact to air quality would be a reduction in baseline emissions.

Table 4.2-1
Significant Emission Rates for Criteria Pollutants

Pollutant	Emission Rate
Carbon Monoxide (CO)	100 tpy[1] (548 lbs/day)
Nitrogen Oxides (NO_x)	25 tpy (137 lbs/day)
Sulfur dioxide (SO_x)	27 tpy (150 lbs/day)*
Volatile Organic Compounds (Ozone)	40 tpy (219 lbs/day)
PM_{10}	27 tpy (150 lbs/day)*

[1] Tons per Year

Sources: Code of Maryland Regulations, Title 26, Chapter 17; * SCAQMD, 1992

4.2.2 Potential Impact of the Proposed Action

The potential to impact air quality may be short-term or long-term. Short-term impacts are associated with construction, while long-term impacts correlate with V-22 operations during testing.

4.2.2.1 Construction

Construction of the ground run stand would impact previously disturbed land near a crossover taxiway within the flightline complex, as shown in Figure 2.1-3. The facility would be about 1,600 square feet in size, but up to 6 acres of ground would be disturbed. Moving about 2,400 cubic yards of soils during grading and leveling (See Appendix A) would be required to build the ground run stand. The VESTL is proposed for construction on an existing parking lot near Hangar 109 (See Figure 2.1-3). Construction for the VESTL would disturb approximately 5,000 square feet of existing pavement.

Several sources of emissions would be associated with the construction activity. These sources include combustion products from construction equipment (e.g.,

graders, trucks, loaders), dust from loading/unloading trucks, trucks traveling on paved areas, construction work trips, and non-work trips (e.g., lunch, errands). The majority of construction would occur over a four month period, with most of the dirt work occurring within a two week period. Potential construction emissions on a busy day during the peak period of construction were estimated, and are shown in Table 4.2-2. All criteria pollutants would be generated at amounts lower than the significance thresholds.

Table 4.2-2
Air Pollutant Emission Rates During Construction

Source	Pollutant Emission Rates (lbs/day) Construction Period				
	VOC	NO_x	CO	PM_{10}	SO_2
Equipment	2.1	26.0	11.5	2.1	2.9
Grading and Filling (PM_{10})	NA	NA	NA	22.4	NA
TOTAL EMISSIONS	2.1	26.0	11.5	24.5	2.9
Significance Criteria	219.0	137.0	548.0	150.0*	150.0*

NA = Not Applicable
Calculations are shown in Appendix A.

Sources: Maryland Code of Regulations, Title 26, Chapter 17; * SCAQMD, 1992.

The quantity of dust emissions from construction is proportional to the area being worked and level of activity. Calculations of the amount of suspended dust emissions from construction are based on an approximate factor of 1.2 tons of fugitive dust (TSP) per acre per month of grading. About 36 percent of the TSP generated would be PM_{10} (USEPA, 1985). The amount of emissions from fugitive dust represents a conservative estimate, since it is based on dry climate factors. Since NAS Patuxent River has a humid climate, emissions would likely be less than calculated. This worst-case day would occur during the fill and excavation construction timeframe. Mitigation measures to address these short-term emissions are presented in Section 4.2.4.

The temporary increases in dust emissions near the construction sites would result in increased atmospheric opacity at the sites. Control measures would be taken to minimize the temporary increase in dust concentrations and opacity. In addition, the winds that are persistent throughout the Chesapeake Bay area most of the year would provide a good diffusion mechanism for air pollutants. Degradation of air quality at a Class I area (defined in Section 3.2.2) would not occur, due to the limited emissions and the distance to any Class I area.

The ground test stand construction would occur over a short period of time in 1995 and the VESTL facility would be constructed in the last quarter of 1995 or the first quarter of 1996. Consequently, construction emissions would not likely be occurring concurrently. Because emissions from construction would be of short duration and easily dispersed, increases of pollutants due to construction are less than the significance criteria. Mitigation measures could further reduce the impacts of construction.

4.2.2.2 Operations

Potential operational impacts would result from changes to NAWC AD Patuxent River mobile and stationary sources. The proposed action would change the frequency of test and flight hours, and therefore exhaust emissions.

Emissions produced during the operations of the proposed action are shown in Table 4.2-3. Baseline values are based on a Summary of Estimated Air Emissions, NAS Patuxent River (AESO, 1994).

Although the GSE inventory would remain similar to baseline conditions, the use of the equipment would increase slightly. The V-22 would also consume about 280,000 gallons of JP-5 jet fuel annually (1.5 percent of installation consumption) when five aircraft are operating, and refueling and fuel storage emissions would increase slightly with the proposed action.

Commuter traffic would increase slightly as a result of adding up to 325 new personnel to the V-22 program over the next three years. The new personnel would constitute less than a four percent increase in vehicular traffic on NAS Patuxent River. Assuming a 25 mile per day commute, approximately 15 tons of pollutants per year would be added to the atmosphere on and in the vicinity of NAS Patuxent River. This is about a 3.4 percent increase in mobile source pollutants and a 9.0 percent increase in overall emissions from baseline levels.

Total criteria pollutant emissions from the V-22 during the maximum operational period (1997 to 1998, long after construction is complete) are compared to baseline rates from estimated air emissions for NAS Patuxent River in Table 4.2-3. The V-22 operations would cause a net increase in total criteria pollutant emissions at NAS Patuxent River of approximately 22.5 tons per year, equivalent to about 4.1 percent of total emissions, based on historic data. Ground testing would add another 0.4 tons. Additional sources of emissions, most of which would originate from mobile sources, would raise the proportion of V-22 related emissions to about 50.5 tons or nine percent of the total baseline emissions. All increases of pollutants due to operations are less than the significance criteria. A continued decrease in total NAS operations, the existing trend, or a slight increase in total operations would create a different baseline upon which to assess the contribution of V-22 emissions. A decrease in total emissions would be beneficial and decrease the effect of increased V-22 operations. An increase in overall

emissions would reduce the proportional contribution of V-22 emissions. Therefore, under different operational scenarios, no significant impacts to air quality would occur as a result of the operations phase of the proposed action.

Table 4.2-3
Maximum V-22 Pollutant Emission Rates

Source (tons/year)	Carbon Monoxide	Sulfur Oxides	Nitrogen Oxides	Hydrocarbons	Particulates
V-22 Operations	7.59	0.17	2.69	5.58	6.49
Test Stand	0.01	0.07	0.19	0.00	0.14
Fueling	0.00	0.0	0.00	5.04	0.00
Construction	2.10	0.53	4.74	0.38	0.50
Mobile Sources*	12.49	0.00	1.39	0.13	0.28
Total	22.19	0.77	9.01	11.13	7.41
Baseline	314.4	13.6	130.6	83.2	5.2
Change	22.2	0.8	9.0	11.1	7.4
Change (in %)	7.1	5.9	6.9	13.3	142.3

* Primarily commuter traffic

Sources: AESO, 1994 (baseline values)
Appendix A (projected values)

Emissions produced during operation of the ground test stand would include exhaust from aircraft engines and fugitive VOC emissions from fuel transfer. The ground test stand is to be used to conduct rotor aeroelastic whirl and preliminary flight acceptance testing amounting to approximately 60 hours of testing. An additional 400 hours of ground tests, including preproduction and ground endurance testing, would be conducted elsewhere. Any source having the potential to have a significant impact on air quality may require a permit to operate (COMAR Title 26, Subtitle 11). The ground test stand operations would not have a significant impact, and an operating permit would not be needed.

Emissions would also be produced during "fog" generation for flow visualization during downwash tests. This testing will use two 4,000 cubic feet per minute gasoline powered portable "fog" generators that create fog by vaporizing a proprietary mixture of low toxicity or non-toxic ingredients. The test area is off the approach end of Runway 20, at the tethered hover site. The "fog" is not harmful, but persons with known allergies should not be nearby. Operation of this "fog" generating equipment would generate less than 0.1 tons of emissions per year (based on 5 hours per month of operation). The "fog" generated is comprised of particles from 0.5 to 50 microns in diameter.

Tests would also be conducted to determine the potential for grass ignition from V-22 hot exhaust. If any grass is ignited, small amounts of particulate matter would be generated until the fire is extinguished. An initial test with one nacelle directed on a 10 foot by 10 foot area resulted in wilting and dying of grass, but no fire (Porter, 1995).

Section 176 of the 1990 Amendments to the Clean Air Act requires that federal agency activities conform to the applicable State Implementation Plan (SIP), assuring that its activities do not aggravate existing air quality violations or delay attainment status. St. Mary's County is currently in attainment for all criteria pollutants. Additionally, emissions from the proposed action would not exceed the *de minimus* yearly thresholds finalized by the USEPA at 58 FR 63214 (30 Nov 93) (see 40 CFR 93.153(c)(i)). Consequently, a general conformity determination is not applicable or required for the proposed action.

According to the CNO guidance issued pertaining to the Clean Air Act and General Conformity Rule, considerations must be made for emissions outside installation boundaries. Additional commuters to the installation were considered in assessing mobile emissions. The analysis accounted for aircraft operations, focusing on emissions associated with operations occurring at NAS Patuxent River (taxiing. takeoff, climbout, etc.). The amount of flight operations in Calvert County (serious nonattainment for ozone) would be negligible because area R4007, which includes Calvert County, is within the Airport Radar Service Area of NAS Patuxent River; use of this area for test purposes would effectively close the airport. Conformity still occurs, regardless of emissions from vehicles of personnel commuting from Calvert County or for aircraft flying in Calvert County because emissions are below *de minimus* thresholds.

Due to the distance of sensitive receptors from the test stand and runway (more than one mile), the infrequency of V-22 operations, and natural dispersion of pollutants over distance due to the winds and atmospheric turbulence, only minimal amounts of pollutants would reach any sensitive receptor. No significant impacts to sensitive receptors would occur.

4.2.3 Potential Impact of the No Action Alternative

Current impacts to air resources are insignificant. The no action alternative would discontinue the V-22 test program. If the V-22 program were discontinued, and existing aircraft (e.g., CH-46s) were used to fulfill some of the V-22 mission needs, additional testing of modified replacement aircraft would be necessary. Assuming that the replacement testing would occur at NAWC AD Patuxent River, air quality impacts would be greater than those predicted for the proposed action.

Several types of aircraft would need to be modified, with each type of aircraft fulfilling some of the V-22 mission requirements. The modified replacement aircraft would each require testing. The multiple tests would have a corresponding

effect on air quality. That is, if three types of replacement aircraft are flown to conduct electrical demonstrations instead of only the V-22, air emissions associated with the testing could be tripled. The exact amounts of air emissions would depend on the type of aircraft tested, the length of the tests, and test parameters, but the overall impact would be substantially greater if multiple aircraft were to be tested. In addition, support personnel trained to work with each type of replacement aircraft would be associated with that aircraft's specific testing, and would add to the overall air emissions from the Station.

4.2.4 Mitigation Measures

Adverse effects to air quality from construction can be mitigated by employing standard mitigation measures. Since the study area is in attainment status for all pollutants and there are no projected significant impacts, the following mitigation measures are suggested to minimize emissions.

To reduce fugitive dust from construction, the contractor should apply approved chemical soil stabilizers to the test stand construction area if it is left in a disturbed condition. Other measures would be to enclose, cover, water twice daily, or apply approved soil binders to exposed stock piles of sand or dirt.

To reduce fugitive dust from grading, the contractor should water active sites at least twice daily and suspend all excavating and grading operations when wind speeds (as instantaneous gusts) exceed 25 mph.

Soil transported to paved areas should be removed as soon as possible or covered when not in use.

To minimize NO_x emissions, the contractor should use construction equipment that has catalytic converters (for gasoline-powered equipment) and prevent trucks from idling longer than two minutes. All construction vehicles should have required emission control devices in place, and should be properly tuned and maintained.

To minimize the impact of mobile sources on air quality, the following steps should be taken:

- Purchase GSE that provides the best emission controls available
- Minimize the run time of the GSE as much as possible
- Ensure that refueling systems have vapor recovery systems installed and are operational
- Encourage participation in a carpooling program for military and civilian employees and construction workers
- Encourage use of any on-base transportation service to reduce vehicular traffic.

4.3 BIOLOGICAL RESOURCES

Consideration of biological resources includes the effects of the proposed and no action alternatives on plants and wildlife, both on the NAS Patuxent River and in surrounding areas. Federally- or state-listed threatened or endangered species are of particular concern. The analysis of the proposed action shows that significant impacts to biological resources could occur, but also that these impacts could be mitigated. The necessary mitigation would include avoidance of critical habitat (such as certain bird nest sites) at certain times of the year, or complete avoidance of areas which may have threatened or endangered species present throughout the year (such as certain plant species). Similar adverse impacts would result from the no action alternative.

4.3.1 Analysis Methods

The assessment of potential impacts focused on the areas in which the V-22 would be operated, and the plant or animal species that live in or move through those areas. The operational areas were identified and compared with the ranges of the species of concern. Evaluation of the timing of the potential V-22 operations, as they relate to the species of concern, was also conducted. The impact of noise from the V-22 on various wildlife outside the operational area is considered, since operational noise will carry beyond the operating areas. A comparison of the effects of the maximum impact conditions (250 operational hours per month) and baseline conditions (100 operational hours per month) is made, although the specific type of operation can be of greater importance. For example, a single flight that would approach an active eagle nest is likely to have a greater impact on biological resources than several flights away from nesting birds.

Impacts to biological resources would be significant if the viability of any threatened or endangered plant or animal species was jeopardized. Impacts to biological resources would also be significant if the viability of a protected plant or animal species was jeopardized, with little likelihood of reestablishment after the action is complete. An adverse but insignificant impact could result if a disturbed population could be reestablished to its original state and condition, or the population is sufficiently large or resilient to respond to the action without a measurable change. The significance of the impact depends upon the importance of the resource, and the proportion of the resource that would be affected relative to its occurrence in the vicinity. An increase in population numbers in response to an enhanced habitat, or the increased viability of a species, could be viewed as a beneficial impact.

Documents including the Wildlife Management Plan, Natural Resource Management Plan, base and topographic maps, previous environmental impact statements and environmental assessments, and noise studies were reviewed to provide data on existing biological resources and potential impacts to various species.

4.3.2 Potential Impact of the Proposed Action

4.3.2.1 Vegetation

Construction of the ground run stand would impact previously disturbed land near the flightline. This area is maintained on a regular basis and is not quality habitat for any protected plant or animal species. Construction of the ground run stand is not near any protected species and therefore would not affect any protected species. Construction of the VESTL would impact previously disturbed land near Hangar 109. This area is currently pavement, therefore, no vegetation or protected species would be disturbed during construction. No wetlands are near the construction sites; consequently, no impacts are projected to occur.

Testing could result in a V-22 landing at various locations, including undeveloped portions of the NAS Patuxent River. During the landing and takeoff of a V-22, the engines are rotated upward and the exhaust gases are pointed directly at the ground. Although a blast shield has been incorporated into the design of the aircraft, the hot exhaust may start fires in grassy areas. An initial grass burn test did not result in a fire; further testing is being considered (Porter, 1995). The areas selected for the landing of V-22s would need to be coordinated with the Natural Resources office, in order to avoid starting fires without adequate safeguards (Rambo, 1994). Given the ongoing coordination efforts and tests, no significant impact to vegetation is projected to occur.

4.3.2.2 Wildlife

Construction noise would be intermittent and along the flightline; consequently, no signficant impacts would occur from wildlife disturbance. Operational activities and the associated noise could disturb wildlife in the immediate flightline area and result in their temporary displacement (i.e., leaving the flightline area). The area around the runways is maintained, which also deters birds and deer from being attracted to the area, and minimizes bird or deer/aircraft strikes. The impact of V-22 operations in the flightline area would not be different than existing impacts from the operation of other aircraft, and would not be significant.

Flying the V-22 throughout the special use airspace would have varying impacts on wildlife. Impacts would result from wildlife's tendency to be startled by sudden sight or sound of the aircraft. Mammals, such as the white-tailed deer, may be disturbed or temporarily displaced by an overflight or other operations of the V-22. Approximately 100 hours per month is the estimated maximum number of flight operations. The impact to most species would be temporary, limited due to the infrequency of V-22 operations, and therefore not significant.

Impacts to migratory bird species are of greater concern, in particular, during the spring and fall migrations. Large numbers of bird species use the Atlantic Flyway, and winter in the Chesapeake Bay. Many bird species are already

provided partial protection through restricted use areas (e.g., Bloodsworth Island), where overflights are prohibited or limited. In other areas, birds may be alarmed by the sight or sound of the V-22, especially when the aircraft is flying at low altitudes or is in helicopter mode. The impact of being chased out of a resting or feeding area could be significant if the birds were harassed frequently. Studies have shown that species vary in their sensitivity to aircraft noise. Snow geese are especially sensitive to jet or helicopter noise, flushing in response to flights below 3,000 feet. Canadian geese are less sensitive, and ducks are generally less sensitive than Canadian geese. In general, direct overflights seem to have a low potential to disturb most waterfowl (ANG, 1989).

Flight information publications identifying bird concentration areas enable pilots to avoid those areas, and are updated and distributed routinely by the flight safety office (Orr, 1995). Bird strikes can damage an aircraft. Avoidance of birds, especially large birds like geese or pelicans, is an important flight safety consideration. Because the operations of the V-22 would be limited, activities (e.g., low level flight or landing the aircraft) would be relatively infrequent, and bird concentration areas are generally avoided, the potential for adverse impacts is limited. Section 4.1 also discussed aircraft-fauna impacts and included a determination that flight safety would not be significantly affected.

4.3.2.3 Threatened or Endangered Species

The V-22 may land at various locations on NAS Patuxent River, and could affect T&E plant or animal species. Potentially affected species include the least tern, tiger beetles, and State-listed plant species. Least tern colonies occur on the sandy beaches at Cedar Point (off limits to people because of radar) and patches of degraded concrete surrounding the V/STOL pad (currently used by Harrier aircraft). Metal plates deflect air blasts from the Harrier aircraft, with some airflow disturbing the nests. Despite the disturbance from aircraft, birds in the pad area have successful hatched (Rambo, 1995). The impacts from V-22 landings or low-flying operations could include air blasts and high temperature exhaust (with the possibility of fire), which may directly damage plants, small animals or bird nests, and indirect effects, which could include chasing birds away from nests. These species are unlikely to include federally-protected species (e.g., the bald eagle), but may impact state species of special concern (e.g., the least tern colonies). The Natural Resources office has identified and mapped known T&E species on the NAS Patuxent River. Current locations of the tiger beetles at Cedar Point and three bald eagle nests in close proximity to NAS Patuxent River are shown in Figure 3.3-1.

The areas identified within the figure, and additional sensitive areas such as bald eagle nests in operating areas other than R4005 and State-listed rare plants, would need to be avoided during V-22 operations. The Natural Resources Manager at NAS Patuxent River is working with the Maryland Department of Natural Resources and the Virginia Department of Game and Inland Fisheries to identify

the locations of bald eagle nests within the restricted operating areas. The eagle nesting season runs from January through June, and most foraging is conducted in the nearby vicinity (USFWS, 1995). Because the V-22 is likely to operate in the general area of the bald eagle nests on some occasions, further analysis of potential disturbance is warranted. Note that while the analysis discusses bald eagles, the following discussion would also apply to peregrine falcons (if falcons established a nest site in the area).

Adverse impacts to bald eagles would be most probable during the nesting season. Chasing the eagles from the nest sites, causing a reproductive failure, would be a significant impact. A second concern would involve harassment or disturbance of the eagles during foraging activities. Numerous studies (see Appendix B) have shown that eagles and other raptors exhibit a considerable tolerance for aircraft in the vicinity of active nests. Most responses to aircraft result when the birds are startled. Because the V-22 is a relatively loud aircraft, and the topography in the general areas of nest sites is fairly level, there would be little potential for approaching eagles or other raptors unexpectedly. A change in operational mode (i.e., from level flight to helicopter mode) would rapidly increase the amount of noise from the V-22, and would have a greater potential to startle raptors.

While studies have shown that eagles are generally tolerant of aircraft noise, noise from the V-22 is qualitatively different than most aircraft. Noise studies on the V-22 are not complete, but sound levels generated by the V-22 in a helicopter mode are roughly comparable to a large helicopter (Dougan, 1994); an AH-1 Cobra helicopter was used to approximate V-22 noise for this analysis. Inflight noise is more comparable to a twin engine propeller plane. While the maximum fly-over noise levels vary widely in magnitude, this analysis uses the helicopter mode to determine noise generated by V-22 operations. Further use of a Sound Exposure Level (SEL) measurement (a single event measure of noise energy) ensures that a conservative estimate is used in estimating noise impacts. Section 3.6 provides a discussion of noise parameters such as SEL.

The SEL of a V-22 directly overhead (while in helicopter mode) at 300 feet would be about 94 dB (ID ANG, 1993). Noise levels at this altitude diminish about 1 to 2 dB per doubling distance. At 1,000 feet away, the SEL would attenuate to about 91 dB. On the ground, the V-22 would generate an SEL of about 92 dB, measured at 250 feet away. Ground attenuation would reduce this sound level to about 86 dB at 500 feet, and to about 80 dB at 1,000 feet.

Further attenuation from trees and terrain (A_f), although highly variable, can be estimated by use of the following formula (Rau, 1980):

$A_f = 0.01f^{1/3}r$ (dB)

where f = frequency in Hz (assuming 4,000 Hz for the V-22), and
r = length through a forest in meters (assuming a deciduous forest)

Using the above formula for a forested area, the SEL from a V-22 landing 500 feet away would be attenuated to about 70 dB (at 300 feet ASL), and to 62 dB (at ground level). At 1,000 feet, the sound would be attenuated to 43 dB (at 300 feet ASL), and to 32 dB (at ground level). The attenuation would depend upon the type and thickness of the forested area. The actual duration and intensity of the noise would vary depending on the proximity of the aircraft, speed, and orientation with respect to the receptor.

While bird responses cannot be predicted in any particular case, several generalizations can be used to avoid impacting a T&E bird species. Direct overflights in a helicopter mode (assuming a low level of flight) are likely to cause a response. Although studies of eagles demonstrate their tolerance to aircraft, the birds being studied have had frequent exposure to aircraft. Infrequent exposure to an aircraft like the V-22 may provoke a greater response. Approaches of closer than 500 feet to nesting eagles (or other raptors) may cause a reaction on the basis of sound alone. Changes in operating modes (to a helicopter mode) may also startle birds with the sudden increase in noise. The USFWS has stated that avoiding eagle nests by 1,320 feet would avoid any potential for disturbing nesting eagles. Aircraft should avoid approaching eagles nests from December through June.

Two threatened tiger beetle species are found in the proximity of NAS Patuxent River. The northern beach tiger beetle occurs at ten locations in Virginia and Maryland, including four sites in Calvert County. One location encompasses the Patuxent River beaches across from the NAS Patuxent River (see Figure 3.3-1). The northern beach tiger beetle is very susceptible to activities on the beach that disturb or compact the sand. The puritan tiger beetle is found on high, gradually eroding cliffs and beaches of Calvert County. There are about ten locations in Calvert County that are known for this species.

If V-22 tests include landing on sandy areas away from the NAS Patuxent River, significant impacts to tiger beetles and their habitat could occur. Avoidance of the tiger beetle locations could be accomplished by coordinating any such test through the Natural Resources office. Landing away from specially designated plants must also be accomplished. The species, location, and status of rare State plants is available in the RAMS database (Rambo, 1995). The site selection for landing the aircraft would need to be coordinated with the Natural Resources office in order to avoid significant impacts. The site selection should be confirmed at a

date close to the test date, since information about T&E species may be updated (e.g., new nesting sites may be used).

4.3.3 Potential Impact of the No Action Alternative

Current impacts to biological resources at and around NAS Patuxent River are adverse but insignificant. If no further V-22 test or evaluation activities are conducted, the mission needs of the V-22 would not be satisfied and impacts to biological resources would be insignificant (only negligibly improved). If other aircraft are upgraded as a partial replacement for the V-22, and are tested at NAWC AD Patuxent River, impacts similar to or greater than those predicted for the proposed action would occur. Additional testing of multiple types of aircraft would increase the potential to disturb both T&E and other avian species, and mitigative measures to avoid significant impacts would be needed.

While there would be no ground disturbance, additional flying activities could affect animal species both on and off Station, and areas identified in Figure 3.3-1 would need to be avoided.

4.3.4 Mitigation Measures

The potential for several significant impacts to threatened or endangered species have been identified, but measures to mitigate the impacts can be used. In addition, good management practices and control measures could be implemented to ensure that other adverse impacts to biological resources remain insignificant.

Areas on NAS Patuxent River that contain T&E species must be avoided during V-22 operations. The site selection for landing the aircraft (other than established or paved areas) would also need to be coordinated with the Natural Resources office to ensure avoidance of significant impacts.

Bald eagle nest sites must be avoided from December through June. A minimum distance of 1,320 feet is recommended to avoid disturbing eagles at the nest sites. The nearest eagle nest is near the West Patuxent Basin of the NAS Patuxent River. The specific nest site and the 1,320 foot buffer area are shown in Figure 4.3-1. The other two nest sites are between the NAS Patuxent River and Webster Field. The general nest site areas are shown in Figure 4.3-2.

Locations where the northern beach tiger beetle and puritan tiger beetle occur must be avoided. Landing or hovering over the sandy sites identified in Figure 3.3-1 must be avoided. Other sandy locations away from the NAS Patuxent River should be cleared through the Natural Resources office. Clearance must also be provided regarding landing in grassy sites to preclude adverse impacts to rare State-listed plants.

The following policies are suggested to reduce adverse impacts from overflights by the V-22: (1) adjust flight altitudes over sensitive nesting or habitat areas; (2) minimize the number of flights over colonies of birds or nesting localities; and (3) adjust flight timing to avoid heavily used periods in the Atlantic migration corridor.

The disturbed area around the ground run stand should be reestablished with ground cover to reduce or prevent wind and water erosion, and prevent the invasion of undesirable weed species.

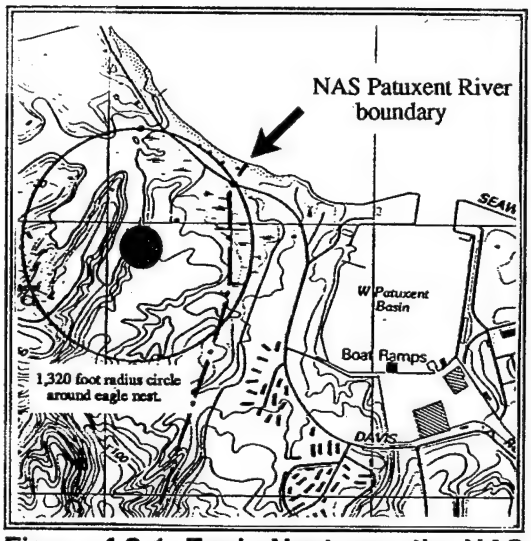

Figure 4.3-1 Eagle Nest near the NAS

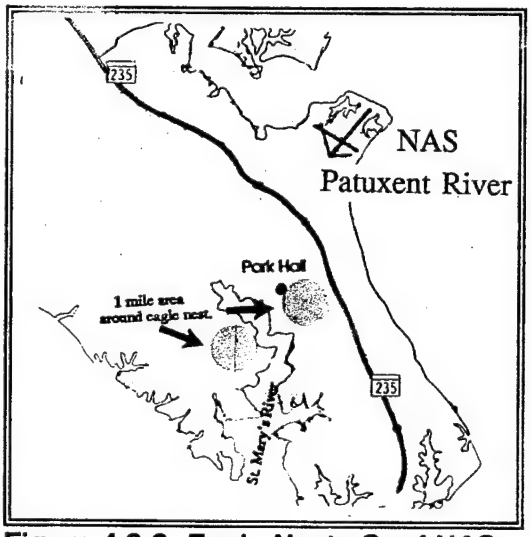

Figure 4.3-2 Eagle Nests S. of NAS

4.4 CULTURAL RESOURCES

Cultural resources are limited, nonrenewable resources whose values may be easily diminished by physical disturbances. No impacts to cultural resources are anticipated from V-22 operations or from the no action alternative.

4.4.1 Analysis Methods

Existing data, including publications and previously written environmental documents, were reviewed to determine the extent and value of any cultural resources. The analysis compared the location and types of cultural resources with V-22 program activities.

The criteria used to determine the significance of potential impact on cultural resources were based on National Register of Historic Places (NRHP) eligibility, future research potential, or suitability for religious or traditional uses. An impact would be significant if it resulted in the physical alteration, destruction, or loss of a resource listed or eligible for listing in the NRHP. An adverse impact would be insignificant if only slight portions of the resource were affected or if the value of the resource were not very important. The impact of the action would be beneficial if it protected or reconstructed the resource.

Take-offs, landings, and flights over or near locations associated with historic resources could diminish or destroy the integrity of the property by introducing unsympathetic visual or audible effects. Visual or audible effects that alter relevant features or the character of the property's surrounding environment or that alter its setting, feeling, or association can cause significant impacts if they affect the qualities that make a property eligible for listing on the National Register of Historic Places (NRHP). The impact would depend on the frequency and altitude of flights and the particular qualities that make the resource eligible for listing on the NRHP.

4.4.2 Potential Impact of the Proposed Action

The V-22 program includes both construction and operational activities. Construction of a ground run stand and VESTL are scheduled, and the EMD/LRIP phase involves producing and testing a limited number of aircraft to incorporate further capabilities prior to full capacity production.

Construction of the ground run stand would occur in an area of the flightline previously disturbed during grading for the runway. Based on surveys conducted by the Navy (USN, 1994b), no archeological or other cultural resources are known to occur in this area. The depth of construction for the ground run stand would be similar to the depth for runway preparation. Because it is unlikely that cultural resources would be disturbed during construction of the ground run stand, no significant impacts are predicted. If cultural resources are unearthed, then mitigation (see Section 4.4.4) would be needed to ensure that no significant impacts would occur. Construction of the VESTL would occur near Hangar 109 in an area that is currently paved; therefore, no impacts to cultural resources are likely.

There have been no known visual or audible effects to historic resources from aircraft flights at NAS Patuxent River. The noise generated by NAWC AD Patuxent River aircraft is insufficient to damage historical properties, such as the Mattapany-Sewell NHRP site. The V-22 aircraft is subsonic and would fly within local tower traffic patterns and airspace currently used; no operational impacts to cultural resources are anticipated to occur.

4.4.3 Potential Impact of the No Action Alternative

Under this alternative, V-22 test operations at NAWC AD Patuxent River would cease. Any replacement program would likely use only existing facilities and conduct test operations similar to the V-22 test program. Impacts to cultural and historic resources would be insignificant.

4.4.4 Mitigation Measures

Because no significant impacts have been identified, no mitigation measures are necessary. However, if excavation during construction for the ground run stand or the VESTL unearths cultural resources, the Navy is required to comply with 36 CFR 800.11. This regulation, established by the Advisory Council on Historic Preservation for the Protection of Historic Properties, includes provisions for emergency discoveries of historic and archeological resources.

4.5 HAZARDOUS MATERIALS AND WASTES

Additional aircraft and personnel associated with the proposed action have the potential to affect several environmental programs (previously described in Section 3.5) at NAWC AD Patuxent River. The need for hazardous materials would increase, as would waste (solid waste, hazardous waste, and wastewater) generated as a result of an expanded V-22 program. Impacts to hazardous materials, hazardous waste, and solid waste management would be adverse, but not significant. The impacts would also be mitigated by pollution prevention programs that would reduce the amounts of hazardous material used and solid and hazardous waste generated. No impacts are anticipated for the IRP. The no action alternative would likely cause a negligible decrease in the amount of materials used and waste generated; no impact would occur.

4.5.1 Analysis Methods

To assess potential impacts, the analysis focused on the types and quantities of hazardous materials that would be used, and solid and hazardous wastes generated. The analysis evaluated existing programs, and the extent to which the proposed activities could affect a given program. Sources of information included site inspections, interviews of base personnel, information about past and current practices at NAWC AD Patuxent River, IRP documents, pollution prevention program plans, state and federal laws and regulations, and similar materials available from public sources.

In order to determine significance, the following were considered: the type and overall quantity of material or waste being handled or generated; the duration of a particular activity using hazardous materials or generating solid and hazardous waste; the potential for releases during handling, transport, storage, treatment, and disposal activities; and the reduction or minimization of hazardous materials and wastes. An impact would be significant if the quantities of any solid or hazardous waste generated by the action exceeded regulatory limits or existing transport or disposal capabilities, if the use of additional hazardous materials or generation of hazardous wastes has a detrimental impact on worker health and safety, or if an IRP site were disturbed or the restoration of an IRP site delayed. A beneficial impact would occur if the cleanup schedule for an IRP site was accelerated, if the types or quantities of hazardous materials or wastes would be reduced or

eliminated, or if the potential for leaks, spills, or exposure to hazardous substances would be reduced as a result of the action.

4.5.2 Potential Impact of the Proposed Action

4.5.2.1 Hazardous Materials Management

The use of hazardous materials under the EMD and LRIP phases is unlikely to impact worker health and safety, or the environment. The V-22 would not require the use of any radioactive materials (Grimes, 1995). Other hazardous materials are already handled through the center, and tracked through its automated tracking system. Additional reductions in hazardous materials are anticipated as the Station's Pollution Prevention Program is implemented. A V-22 Pollution Prevention Plan is already being implemented.

The NAWC AD Patuxent River currently uses about 1,600,000 gallons of jet fuel per month. Based on the 1994 baseline V-22 fuel consumption rates, each V-22 could require up to 4,700 gallons of jet fuel per month (or 0.6 percent of base usage). Fuel usage during the maximum projected operations (with five active aircraft) would be 23,500 gallons per month (or 1.5 percent of base fuel usage). Fuel handling would not require additional equipment or facilities, and personnel responsibilities would not be anticipated to change.

Throughout 1993 and 1994, over 100 fuel spills were reported at NAWC AD Patuxent River. The single largest spill was approximately 300 gallons (Lewis, 1994). While any spill would be considered adverse, these spills would not be considered significant. While the V-22 program has been involved in about one percent of those spills, all of the V-22-associated spills were less than ten gallons (Brown, 1995). The spills were quickly contained and did not threaten the environment (Elliott, 1995). The potential for additional and greater spills as a result of the proposed action would increase negligibly.

Because the additional amounts of fuel required by the V-22 could easily be handled by the current fuels management program, and would negligibly increase the potential for spills to occur, the V-22 program would not have a significant impact on fuels management.

4.5.2.2 Hazardous Waste Management

The increased activities associated with the V-22 would increase total amounts of hazardous waste generated both by military and contractor operations. The NAWC AD Patuxent River generated about 178 tons of hazardous waste in 1994. The V-22 program (with two operational V-22 aircraft) generated about 1.5 tons of hazardous waste in 1994 (about a 0.8 percent of the current total). A maximum increase (based on the use of five aircraft) in waste generation would result in 3.8 tons (or 2.1 percent of current Station totals) being generated. This increase is a

conservative estimate, as no reductions due to pollution prevention initiatives are included. The increase could be handled by the current facilities, and therefore would not have a significant impact on hazardous waste management.

A new Pollution Prevention Plan for NAWC AD Patuxent River is due for completion in October 1995. This new plan is being designed to provide guidance on hazardous waste reduction, recycling, and reuse, and should have a beneficial impact on the overall hazardous waste management program. The V-22 Pollution Prevention Plan specifically identifies materials and processes in the V-22 program that can be changed to reduce hazardous materials usage and, therefore, the generation of hazardous wastes.

In addition to the NAWC AD Pollution Prevention Program and the V-22 Program Pollution Prevention Program, the Joint Contractors for the V-22 Program have been actively pursuing company-wide Chemical Reduction Programs for several years. Bell Helicopters Textron, and Boeing Defense & Space Group, Helicopters Division participated in the EPA's Voluntary 33/50 Program, which targeted 17 chemicals believed by the EPA to be the worst pollutants. Bell and Boeing have also been targeting sources of VOCs used in materials required to manufacture and support their products.

4.5.2.3 Solid Waste Management

The increased activities associated with the V-22 program would increase the total amounts of solid waste generated. Although solid waste quantities generated by the V-22 program are unknown (Donmoyer, 1995), percentage increases could be similar to increases of other wastes (i.e., hazardous wastes). The V-22 program (using two aircraft) generated less than a 1 percent increase in total amounts of hazardous waste in 1994. Assuming a similar increase (0.8 percent) in solid waste, the increase would have been about 40 tpy. A maximum increase (based on five aircraft) of solid waste generated could therefore be about 100 tpy (2 percent). The solid waste program increases (of up to 100 tpy) would not affect disposal agreements. The proposed action would therefore not have a significant impact on the solid waste management program.

4.5.2.4 Wastewater Management

Wastewater discharge is regulated by a NPDES permit held by an offsite municipal WWTP (Pine Hill Run). The decrease in discharge (similar in quantity to the increase in potable water use) caused by implementation of the proposed action would be negligible because of the low number of personnel and the minimal amounts of wastewater generated. Consequently, no significant impact is projected to occur.

4.5.2.5 Installation Restoration Program

The only potential impact to the IRP would occur if construction disturbed an IRP site. The only construction under the V-22 project would be the building of a ground run stand. While there are 32 IRP sites at NAS Patuxent River, only five of the sites are located in the vicinity of the proposed ground run stand. These sites and the ground run stand are identified in Figure 4.4-1. The nearest site would be over 1,500 feet away, and construction of the stand would not disturb an existing IRP site. Construction of the VESTL would not impact any IRP sites. Therefore, no significant impacts to the IRP would occur under the proposed action.

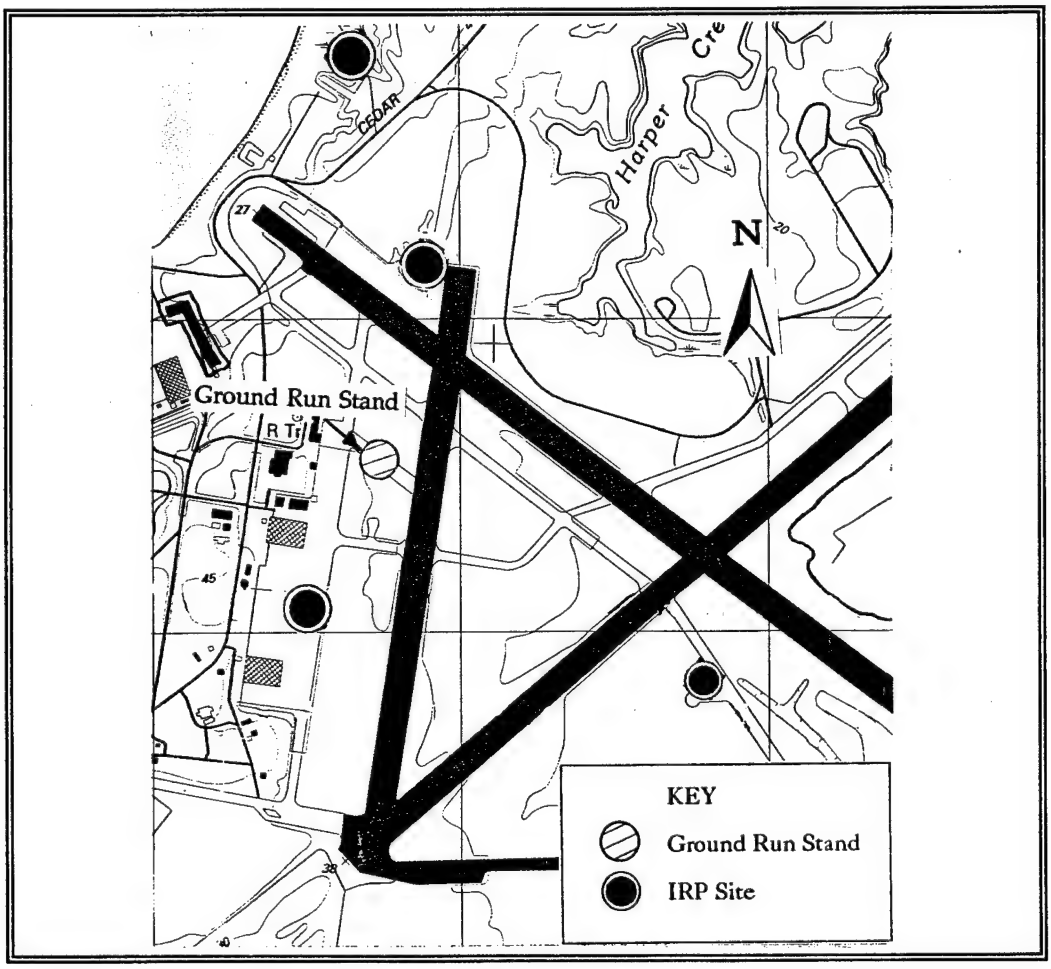

Figure 4.4-1 IRP Sites and the Ground Run Stand

4.5.3 Potential Impact of the No Action Alternative

The no action alternative would result in no further testing of the V-22. If there were no tests conducted by NAWC AD Patuxent River on other aircraft to replace the V-22, the levels of hazardous material use and waste generation would be reduced, and no impact would occur.

If other aircraft were tested as replacements for the V-22, impacts greater than those predicted for the proposed action would occur. The older aircraft that would be tested to replace some of the V-22 mission requirements were originally designed without incorporating pollution prevention initiatives. The V-22, however, has already had such design changes. For example, the fuel inlets have been modified in order to help prevent fuel spills. Other older aircraft models could be retrofitted, but design changes are no longer possible. These aircraft are likely to require a greater usage of hazardous materials and generate more hazardous wastes. In addition, more replacement aircraft would be tested than V-22 aircraft, which would also require the use of additional materials and generate additional waste. The overall Station pollution prevention plan would still be implemented, but the V-22 pollution prevention plan would not be used.

The impact of a replacement program cannot be determined precisely without knowing the types and numbers of aircraft and the types and numbers of tests to be conducted. However, the NAWC AD Patuxent River has or could add additional material and waste handling capabilities, and use of added hazardous materials is not likely to significantly impact worker health and safety. The impact would be greater than the proposed action, but would not likely be significant.

4.5.4 Mitigation Measures

No significant impacts to environmental programs are projected for the proposed action or the no action alternative. The following mitigation measures are suggested to improve existing programs.

While the adoption of hazardous material and waste pollution prevention plans will be beneficial, actively pursuing the recommendations resulting from the plans would offset any added adverse impact due to the continuation of the V-22 program. Plan recommendations assist in decreasing the risk involved with handling, usage, and transportation of hazardous materials and wastes. Further precautions include continuing worker training for the use, handling, and storage of hazardous materials, and the use of safety equipment.

The facility has a spill prevention plan to mitigate the potential for spills. The V-22 also has a new fuel system design that helps to prevent spills that result from overfilling. Identifying and addressing other causes for spills would further reduce

the potential for spills. Maintaining existing emergency spill response team capabilities is necessary to respond to spills.

4.6 NOISE AND LAND USE

This section evaluates the relative significance of potential change in the noise environment that would result from the proposed action. Magnitude of noise levels and the proximity of noise-sensitive receptors are the major factors that influence the degree of noise impacts.

No significant impacts from implementing the proposed action are projected to occur. The noise environment would be insignificantly affected from increased noise associated with construction and operation of the ground test stand, operation of aircraft from the stand, and from V-22 flights. The noise environment would be insignificantly affected from increased noise associated with construction of the VESTL. Under the no action alternative, the V-22 program would cease operations and construction of a ground run stand and VESTL would not occur. The relative change in overall base noise levels would constitute no impact. The action would comply with EO 12989, as no adverse human or environmental impact to any minority or low income population would be caused by the proposed action or alternative.

4.6.1 Analysis Methods

The information presented in Section 3.6 is the basis for evaluating noise impacts from the proposed action. The analysis is based on identifying any sensitive receptors (people in a residence, schools, hospital, or church) located within an area potentially affected by noise generated by construction to support test activities and by operation of the V-22. Some protected species of wildlife are also considered noise-sensitive receptors. Noise impacts to wildlife are discussed in Section 4.3.

A perimeter distance of 1,000 feet has been established for potential construction noise impacts because noise levels outside this perimeter would likely attenuate below 65 dBA (A-weighted sound levels), which is the level of potential noise concern. The 65 dBA noise level was chosen because it approximates the division between a quiet and moderate sound level. If the noise level at a sensitive receptor location is above 65 dBA, it would be considered a significant impact. For operational noise, increasing L_{dn} levels to between 65 and 75 dBA would be significant impact. If noise levels increased, but to a level below 65 dBA at noise-sensitive receptors, an insignificant impact would occur. A decrease in noise levels would be a beneficial impact.

Noise that could be generated from operation of the V-22 would vary according to altitude of operation, the length of operation, and power levels that the V-22 is operated at (or flight speed). Additional variables affecting the perception of

noise by residents of nearby communities include distance from the noise source and the time of V-22 operation.

Because direct noise generation information for the V-22 was not available for this assessment, a representative noise sample was used to estimate the noise generated by operating a V-22. Noise generated from the V-22 in a "helicopter" mode is similar to a UH-1 Cobra (Dougan, 1994). An AH-1 Cobra [which generates a noise level within one dB of the UH-1 Huey (U.S. Army Environmental Hygiene Agency, 1993)] is therefore used as a representative model to determine noise generated by the operation of a V-22 during takeoff and landing operations. For horizontal flight (in a fixed wing mode), noise levels from a C-12 aircraft were used as a representative model to estimate noise levels.

4.6.2 Potential Impact of the Proposed Action

4.6.2.1 Construction

Noise near the flightline and Hangar 109 would be generated by construction equipment operating during construction of the ground test stand and VESTL. Typical noise levels at construction sites have been measured at 90 L_{eq} at a distance of 90 feet (U.S. Army Corps of Engineers, 1978). This would attenuate to about 70 L_{eq} at a distance of 600 feet, to 54 L_{eq} at 3,200 feet, and to 48 L_{eq} at a distance of 6,400 feet. This is well below the ambient noise levels at this distance. Potential noise-sensitive receptors on-base include the chapel, hospital, and day care center; all are 5,000 feet or more from the proposed site of the ground run stand and VESTL. Thus, noise generated during construction would be insignificant.

4.6.2.2 Operation

Both ground and flight tests of the V-22 are conducted. Sources of noise from a rotor type aircraft include turbine engine noise, rotor rotational noise, and blade slap. Blade slap is a distinctive low frequency noise generated by one blade cutting through a vortex of air generated by another rotor and the resulting shock.

Ground tests would occur at the ground test stand (see Figure 2.1-3). The continuous noise generated by ground testing (as compared to intermittent noise generated by a flyover of an aircraft) could be slightly more annoying to people as compared to flyover noise. Operation of a V-22 at 0 feet altitude would generate a Sound Exposure Level (SEL) of about 92 dBA, measured at a distance of 250 feet from the noise source. Ground attenuation would reduce this sound level to about 86 dBA at 500 feet, and to about 80 dBA at 1,000 feet. If these tests extended into the nighttime, the perception of the noise would be somewhat greater than in the daytime because ambient noise levels are typically about 20 dBA lower.

The noise from ground testing would attenuate to about 63 dBA near the chapel located 7,600 feet southwest of the ground test stand. Indoors, this would be attenuated at least 25 to 30 dBA of sound energy (NAVFAC P-970, 1978). Thus, indoor levels of noise experienced from the V-22 ground testing would be about 33 to 38 dBA. This is within the quiet range of noise perception (See Figure 3.6-1). The impact at the chapel during use would be adverse, but insignificant because of the current noise environment. The nearest off-base residential area is located about 9,000 feet south of the proposed ground test stand. Noise generated by ground tests would attenuate to an SEL of about 60 dBA. This is consistent with the existing noise environment, and would have an insignificant impact on residents of this area.

During 1994, V-22 flight operations averaged about 15 hours per month. The number of V-22 operations would increase to a maximum of approximately 100 hours per month in 1997 and 1998. Flights in the takeoff mode would generate an SEL of about 92 dBA at 0 feet altitude, as measured from a distance of 250 feet. This would attenuate to about 86 dBA at a distance of 500 feet, to 80 dBA at a distance of 1,000 feet, and to 74 dBA at a distance of 2,000 feet. This is much quieter than a typical jet aircraft takeoff which generates noise levels of about 120 dBA. At an altitude of 300 feet, the V-22 would generate an SEL of about 94 dBA, as measured at a distance of 250 feet (ID ANG, 1993). Noise levels at this altitude diminish about 1 to 2 dBA per doubling distance. Thus, noise generated at this altitude would diminish to about 90 dBA at 1,000 feet. At 1,000 feet, SEL levels would attenuate from 92 dBA directly below the V-22 to 90 dBA at a distance of 1,000 feet to the side. These noise levels are consistent with SELs associated with jet aircraft (such as F-18s) that currently operate at NAWC AD Patuxent River. During horizontal flight (in a fixed wing mode), noise levels would decrease dramatically, to an SEL of about 75 dBA at an altitude of 1,400 feet, as measured about 1,500 feet to the side of the flight path. This noise level would be lower than a typical jet at this altitude (with an SEL of about 95 dBA). The impacts of V-22 operations would have an adverse, but insignificant impact on existing noise conditions at and in the vicinity of NAWC AD Patuxent River.

The existing AICUZ contours were last updated in 1984 to accompany a 1979 draft AICUZ study for NAS Patuxent River. No changes in land use as a result of the proposed action are projected to occur. The AICUZ is based on averaging noise generated from aircraft. Because rotary aircraft, which include the V-22, have the capability of vertical takeoffs and landings, noise patterns are different than for fixed wing aircraft. The small number of V-22 operations relative to base operations would negligibly affect the location of noise contours.

4.6.3 Potential Impact of No Action Alternative

Assuming that there would be no replacement program for the V-22 if the program is stopped, the number of operations would decrease from baseline

conditions and a negligibly beneficial decrease (no impact) in noise levels would occur. If a replacement program was scheduled for NAWC AD Patuxent River, noise impacts would likely be similar to or greater than those predicted for the proposed action as more replacement aircraft would likely be tested for longer periods of time.

4.6.4 Mitigation Measures

Although significant impacts are not anticipated, flights should be directed at least one-half mile away from residential areas to reduce the potential for noise disturbances. The AICUZ study and the AICUZ contours predate the arrival of V-22 aircraft at NAS Patuxent River. Although the V-22 program only constitutes a minuscule fraction (approximately 1 percent) of operations at NAWC AD Patuxent River, the AICUZ study should be updated to address new aircraft and updated information.

4.7 SOCIOECONOMICS

Impacts to socioeconomic resources could result from the relocation of personnel and their dependents associated with the proposed action, and from constructon expenditures. Impacts to socioeconomic resources are expected to be slightly beneficial to employment between 1995 to 1997, and negligible after 1997. No impacts are expected to population, the housing market, and local schools. The no action alternative would slightly reduce employment but cause no impact.

4.7.1 Analysis Methods

Measures used for impact analysis include population, employment, and housing. Population and housing data were obtained from the U.S. Census for 1980 and 1990. County, State, and United States employment data were obtained from the U.S. Bureau of Economic Analysis. Employment diversification measures, multipliers, and rational threshold values were obtained from the Economic Impact Forecasting System (EIFS) operated by the U.S. Army Corps of Engineers Construction Engineering Research Laboratory (CERL).

Significance criteria for socioeconomic resources are determined for each region of influence (ROI) by analyzing long-term fluctuation in elements such as population and employment within that ROI. This analysis allows an ROI-specific determination of the appropriate levels, or thresholds, beyond which changes in population or employment would noticeably affect individuals and communities. Based on this methodology, a significant impact for this ROI, St. Mary's County, would be an increase or decline of more than 2.3 percent in projected population.

St. Mary's County experienced high employment growth during the 1980s, with peak growth in 1988 and fluctuating growth from year to year. Because of this, the significance threshold for employment is quite high; a significant impact

would be an increase or decline of more than 7.3 percent in projected employment. Figure 4.7-1 shows population and employment trends between 1970 and 1992.

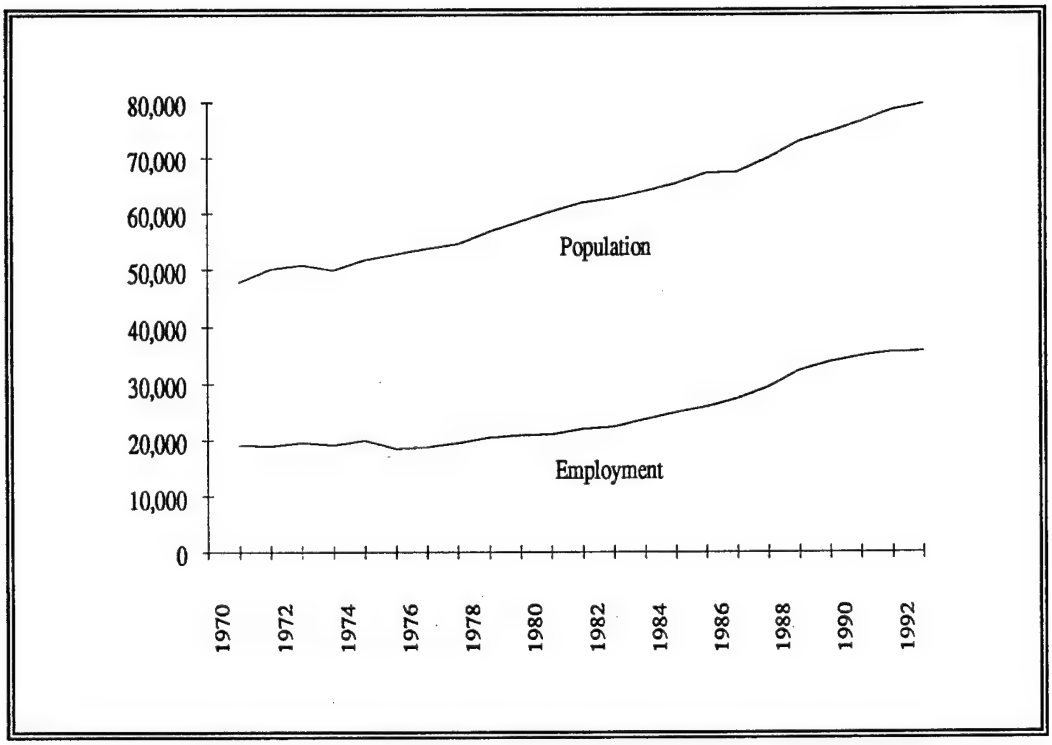

Figure 4.7-1 St. Mary's County Population and Employment, 1970-1992

A significant change in population or employment, in the short term, could noticeably affect local labor and housing markets as well as local services. In the long term, it could change a community's existing structure and organization. An insignificant impact would not be noticeable in housing demand, school enrollment, public service demands, or local government revenues or expenditures. Impacts may be adverse or beneficial.

4.7.2 Potential Impact of the Proposed Action

4.7.2.1 Population

Table 2.1-1 shows the personnel authorizations related to the proposed action. Approximately 105 new authorizations are slated for 1995, 175 for 1996, and 45 for 1997. After that year, the authorizations associated with the proposed action will decrease by 5 in 1998, by 23 in 1999, and by 32 in 2000. It is assumed that personnel would be accompanied by an average of 2.5 dependents, and that residence patterns of incoming personnel would be similar to those of existing employees at NAS Patuxent River. It should also be noted that while the estimates are based on the assumption that all personnel filling the authorizations

would relocate to the area, this is not likely to be the case; some slots would undoubtedly be filled by persons already living in the area. Thus, the estimated impacts may be slightly overstated.

Table 4.7-1 shows the estimated increases in St. Mary's County population as a result of the proposed action through the year 2000. Based on these estimates and assumptions, the proposed action would provide increases of only 0.0 to 0.5 percent over the projected yearly population levels. Since a significant impact has been defined as a change exceeding 2.3 percent, this would not constitute a significant impact to St. Mary's County population.

4.7.2.2 Employment

The increases in employment at NAS Patuxent River would have a multiplier effect on other employment in the region, because military and DoD civilian employment is considered a basic employment industry.

Table 4.7-1
Estimated Increase in St. Mary's County Population from Proposed Action

	1995	1996	1997
Projected Population[a]	85,457	87,503	89,599
Estimated increase in population — personnel and dependents	223	427	64
Change as percent of projected St. Mary's County population	0.3%	0.5%	0.1%
	1998	**1999**	**2000**
Projected Population[a]	91,744	93,941	96,191
Estimated increase in population — personnel and dependents	-15	-63	-46
Change as percent of projected St. Mary's County population	0.0%	-0.1%	0.0%

[a] Population projections are based on the 1980-1990 rate of increase, without the proposed action.

Source: U.S. Bureau of the Census, 1990.

A basic industry is defined as an industry that produces goods or services (for example, national defense) that are consumed or exported outside the region. This industry brings outside money into the economy that supports local service and non-basic businesses. A non-basic industry is generally a service-oriented business that serves other local businesses or the consumer needs of the population

in the immediate area, and usually does not earn income or do business outside of its regional location. The ratio of basic to non-basic employment in a given region is the employment multiplier, which indicates the potential increase or decrease in total jobs in the community as a result of changes in basic industry employment. Because the new secondary jobs tend to follow the residence patterns of the incoming population, it is assumed that 89 percent of the secondary employment would be created in the ROI, St. Mary's County, in accordance with the distribution of NAS Patuxent River employee residence.

Although employment at NAS Patuxent River is considered to be a basic industry, the military employment does not have the full impact on the local non-basic employment sector that would occur with a private basic industry business of a similar employment size, because a significant amount of goods, services, and housing are consumed on the military installation (ORNL, 1987). Therefore, for this analysis, the multipliers for the ROI were reduced by approximately 50 percent, resulting in a "modified multiplier." The modified multiplier for the ROI is 1.02, meaning that for each new military authorization, an additional 0.02 job would be generated in the non-basic sectors, for a total of 1.02 jobs. Civilians, however, are generally ineligible to purchase most of the goods, services, and housing on the military installation. For this reason, the unadjusted multiplier is used to calculate the impact of civilian employment on the local economy. The St. Mary's County multiplier is 1.96, meaning that for each civilian job, almost one additional job would be generated in the non-basic sectors, for a total of approximately 2 jobs.

Estimated impacts on employment are based on the same assumptions regarding residence patterns that were used to assess population impacts. Based on the number of new authorizations and on the modified military multiplier and the unadjusted St. Mary's County multiplier, discussed above, these positions would generate approximately 64 jobs in 1995 in St. Mary's County, 122 jobs in 1996, and 18 jobs in 1997. After that year, indirect jobs associated with the proposed action would decrease by 4 in 1998, by 18 in 1999, and by 13 in 2000. It is assumed that 89 percent of the secondary jobs would be in the ROI, St. Mary's County, and that the jobs would be created within the same timelines that population increases would occur.

Taking these assumptions into account, Table 4.7-2 presents the potential impacts to ROI employment as a result of the proposed action.

Since a significant impact for employment has been defined as an increase of more than 7.5 percent, the proposed action would result in insignificant impacts to employment. However, the occurrence of job growth, without the negative impacts that may be associated with large or rapid population increases, is assumed to be helpful to an area. Therefore, the employment impacts related to the proposed action would be considered slightly beneficial through 1997. Thereafter, the impact to employment would be insignificantly adverse.

There is a small amount of military construction planned as part of the proposed action, for the 5,000 sq. ft. VESTL facility and other small construction projects, which are expected to be completed by mid- to late 1996. This construction would have an beneficial but insignificant impact on the local community in terms of employment and income.

No adverse impacts to the local construction labor force are expected, as there is an adequate skilled labor force in the region to accommodate this construction. It is highly unlikely that construction workers would relocate into the area; therefore, no impacts to population, housing, or schools would result from the construction activity.

4.7.2.3 Housing

Housing unit vacancy data from the 1990 Census for St. Mary's County show that approximately 8.5 percent of total units are vacant, representing more than 2,300 available housing units. In the highly unlikely event that all new personnel authorizations are filled by persons relocating into the area, no more than 107 new households would move into St. Mary's County in 1995, 175 households in 1996, the peak year of personnel increase, and 46 households in 1997. Following that year, a few households could leave the County each year as personnel authorizations decline. Given this scenario, the local housing market would respond to the small increases in demand without experiencing shortages that would affect housing values.

4.7.2.4 Schools

It is assumed that incoming personnel would be distributed around St. Mary's County and the surrounding areas in a similar pattern as existing employees. Because the incoming population would be such a small percentage increase over the projected population levels, no adverse impacts are expected overall to the St. Mary's County and other local school systems. However, it is possible that short-term insignificant impacts could occur in 1996 or 1997 at individual school facilities if these facilities were at or near capacity.

Table 4.7-2
Estimated Increase in St. Mary's County Employment from Proposed Action

	1995	1996	1997
Annual Increase in Authorizations:			
Military	33	33	25
Civilian / Contractor	74	142	21
TOTAL	107	175	46
Estimated secondary jobs in St. Mary's County	64	122	18
Increase as percent of projected St. Mary's County employment	0.2%	0.3%	0.0%
	1998	**1999**	**2000**
Annual Increase in Authorizations:			
Military	0	-2	-17
Civilian / Contractor	-5	-21	-15
TOTAL	-5	-23	-32
Estimated secondary jobs in St. Mary's County	-4	-18	-13
Increase as percent of projected St. Mary's County employment	0.0%	0.0%	0.0%

Source: U.S. Bureau of the Census, 1990.

4.7.3 Potential Impact of the No Action Alternative

The no action alternative would involve the cessation of the V-22 program and result in no impact. As a result of the decrease in personnel authorizations at NAWC AD Patuxent River, very small decreases in population and employment could occur in St. Mary's County. However, if another program with similar operations were to replace the V-22 program, similar impacts to those described in Section 4.7.2 would likely occur.

4.7.4 Mitigation Measures

No mitigation measures are required since only negligible impacts are expected. The NAWC AD Patuxent River should work closely with local community officials, especially school districts, to avoid any negative impacts associated with the small numbers of incoming personnel.

4.8 WATER RESOURCES

Water resources are surface and subsurface resources that are finite but renewable. Impacts to water resources at NAS Patuxent River would occur from aircraft support activities and construction of the ground run stand and VESTL. As discussed in detail in the following subsections, the effects of construction, aircraft operations, and a small increase in personnel would not cause significant impacts to water resources at NAS Patuxent River.

The increase in demand for water and production of wastewater would be adversely insignificant. Under no action, assuming no replacement program for the V-22 would occur at the NAWC AD Patuxent River, water resource impacts would negligibly decrease (no impact would occur).

4.8.1 Analysis Methods

The analysis involved evaluating the activities necessary to expand the V-22 program at NAWC AD Patuxent River. Activities that could involve potential movements of contaminants to surface water or groundwater were assessed. Supply, demand, and capacity for potable water and wastewater were evaluated through a comparison of baseline and projected information. Information was gathered primarily from existing documents and interviews with installation personnel.

Any impact to water resources at NAS Patuxent River would be considered potentially significant if an aquifer, groundwater well, or surface water body is damaged resulting in a measurable change in a user's water supply, or if the quality of water is affected so that it exceeds federal or state water quality criteria. An impact would be insignificant if the change in the water quality did not exceed criteria, or the change in water quantity was unmeasurable. Increased recharge or improved water quality are examples of beneficial impacts.

4.8.2 Potential Impact of the Proposed Action

4.8.2.1 Surface Water

The amount of ground disturbance required for construction of the ground run stand would be approximately 6 acres along the flightline and approximately 5,000 square feet near Hangar 109. A stormwater discharge permit for construction would be required for the ground run stand and VESTL building because the construction site areas both exceed the state criteria of 5,000 square feet (the actual footprint of constuction activities for the VESTL building would exceed the criteria). A General Permit for erosion control could be obtained from the MDE Sediment and Stormwater Administration. As outlined in general permits, best management practices concerning erosion control would be strictly enforced to minimize runoff or wind transport of sediments into water. Because the sites are

not near any surface water, and because erosion controls would be needed, impacts to surface water quality from sedimentation would be insignificant.

The V-22 program would not affect the 100-year floodplain which borders NAS Patuxent River nor would it adversely affect the natural value of the Patuxent River or its designation as a Scenic River. Project activities would occur in a coastal zone under the definition of the Maryland Coastal Zone Management Program. Although coastal lands held in trust by the Federal Government are excluded from the Maryland Coastal Zone Management Program, NAWC AD Patuxent River activities are consistent, to the maximum extent practicable, with the management zone guidance. Disturbance of coastal land, occurring under the proposed V-22 program, would not effect the coastal zone. Minimization of sedimentation of ponds is included in the program and would be met through the use of erosion control measures.

4.8.2.2 Groundwater

A total of six acres would be disturbed through shallow grading and site preparation for the ground run stand. Of this disturbed area, only one to two acres would be paved. This area constitutes less than 0.02 percent of the total area of installation and would not adversely affect groundwater recharge. For the VESTL building, a paved area will be disturbed so no loss in recharge would occur. Only surface disturbance is projected for the construction of the ground run stand and VESTL. Grading and paving operations are not expected to intercept the groundwater table, and no aquifer disturbance is projected to occur.

The current peak demand for groundwater is about 1.1 mgd. The system capacity is 5.6 mgd, and therefore there is an excess supply. The requirements for the V-22 program would be about several hundred thousand gallons per day, and the current water supply would be adequate. In addition, groundwater levels in the aquifers underlying NAS Patuxent River have shown slight increases (Maryland Geological Survey, as cited in USN, 1994b). No infrastructure changes would be needed. Consequently, the minimal increased demand would negligibly affect the groundwater supply.

4.8.2.3 Water Quality

Wastewater discharge is regulated by a NPDES permit held by an offsite municipal WWTP (Pine Hill Run). The increase in discharge (similar in quantity to the increase in potable water use) caused by implementation of the proposed action would be insignificant and would not cause an exceedance in WWTP capacity, nor the permitted limit of NAS Patuxent River usage of the WWTP.

Following the requirements for erosion control measures, as well as installation or contractor spill prevention and response plans for hazardous substances,

minimizes the potential for a significant impact from sediment or chemical pollution of groundwater or surface water.

The stormwater drainage system is permitted (NPDES MD 0020150) at NAS Patuxent River. The proportional increase in pavement in the watershed of the area planned for the ground run stand construction is minimal (a maximum of three percent). Consequently, the drainage system is not expected to be significantly affected.

Given the minimal area and depth of disturbance, the small increase in personnel, and the adherence to erosion control, sedimentation, stormwater management, and spill plans, no significant impacts to water quality are expected to occur.

4.8.3 Potential Impact of the No Action Alternative

Continued operation of NAWC AD Patuxent River activities without the V-22 program would result in no impact (only a negligible decrease in water use and wastewater generation). Current impacts on water resources are insignificant and would continue under this alternative. If a replacement program for the V-22 would be instituted for NAWC AD Patuxent River, the ground run stand and VESTL building would not be constructed and and no sedimentation could occur. There may be some added potential for increased fuel spills due to the use of older aircraft, but the overall impact to water resources would likely be similar to the proposed action.

4.8.4 Mitigation Measures

No potential significant impacts to water resources have been identified as a result of the proposed action. Adherence with permit requirements precludes the need for mitigation measures.

4.9 UNAVOIDABLE AND CUMULATIVE IMPACTS

Unavoidable impacts are those that would occur regardless of mitigation (e.g., operation of construction equipment and operating aircraft will cause air emissions). Cumulative impacts are those changes to the physical, biological, and socioeconomic environments which will result from the proposed action or no action, in combination of reasonably foreseeable actions described in Section 2.4.

4.9.1 Aircraft Operations

The introduction of additional aircraft at NAWC AD Patuxent River would result in an increase in operations and flight traffic that would expose the public to a greater risk of accidents involving aircraft. While this adverse impact is unavoidable, it would be insignificant because the flight time of the V-22 would be minimal, and because the NAWC AD Patuxent River is specifically designed

to test aircraft. Flight test programs, including those for the T-45A and V-22 aircraft, are currently ongoing and the planned tests or no action would not cause a significant cumulative impact regarding safety, airspace use, and aircraft-fauna collisions.

4.9.2 Air Resources

Construction pollutant emissions and operational emissions from increased mobile and stationary source emissions are unavoidable. Some of the construction pollutant emissions (i.e., particulates from soil disturbance and equipment emissions during idling) can be reduced by mitigation measures (such as watering disturbed soil and turning off the equipment if it would be idling for more than one minute), and would be temporary. Because the equipment must still be used, some pollutant emissions during construction are unavoidable. Operational emissions associated with the new facilities would increase beyond the existing emissions baseline. Construction and new operations for other activities would occur intermittently at different locations at the Station, and would be cumulative with the proposed and no action alternative. However, NAS Patuxent River is in St. Mary's County, an area in attainment for all criteria pollutants. The proposed action and alternative would comprise a minimal proportion of baseline emissions (see Section 4.2) and would not exceed criteria levels. Consequently, significant cumulative impacts to air quality would not occur.

4.9.3 Biological Resources

An unavoidable impact, which would only occur under the proposed action, would be disturbance of several acres of vegetation during construction of the ground run stand. The area is on the flightline and has been previously disturbed and is maintained to prevent excess growth. Construction activities for the 1993 realignment action include clearing 16 acres of forested land, and 6 acres of agricultural, scrub areas, and open fields. The disturbance constitutes less than 1 percent of the forest and scrub vegetation. In combination with the proposed action or no action, no significant cumulative construction impacts are anticipated. Unavoidable noise impacts to birds and other wildlife are insignificant. Disturbance of T&E species must be avoided, as discussed in Section 4.3. Cumulative impacts to T&E species are not projected to be significant. The return of bald eagles to the area, despite current activities, supports this finding.

4.9.4 Cultural Resources

There is little likelihood of affecting previously unknown or undisturbed resources or historic structures, and no unavoidable impact has been identified. Therefore, no cumulative impacts are likely to occur.

4.9.5 Hazardous Materials and Wastes

Unavoidable impacts include the safety hazards inherent in the handling, use, and transportation of increased amounts of hazardous materials and hazardous wastes. Production of solid waste debris from construction activities is unavoidable. An increase, in the use of hazardous materials and the generation of solid and hazardous wastes, would occur. The increases would also be cumulative. However, the increase in material usage and waste production would be minimal, and would not exceed current and projected waste disposal capacities. IRP sites are not scheduled to be disturbed as part of the proposed action or other construction projects. Consequently, there would not be any significant cumulative impacts to hazardous materials, hazardous waste, or solid waste programs from the proposed action. Under the no action alternative, the increases in materials used and wastes generated would not occur, resulting in insignificant cumulative impacts.

4.9.6 Noise and Land Use

Noise associated with flight and ground testing of the V-22 aircraft and construction of the ground run stand and VESTL are an unavoidable impact. Under no action, the ground run stand and VESTL would not be constructed and no unavoidable construction noise would occur. Other construction activities at NAS Patuxent River would be occurring intermittently at separate locations. The increase in noise levels as a result of implementing the proposed action would not significantly increase existing noise levels at the installation. There would be no significant cumulative impacts.

4.9.7 Socioeconomics

No unavoidable impacts are anticipated. Population and employment impacts of the proposed action may be increased very slightly when combined with impacts from incoming personnel related to the relocation of other NAWC AD personnel to the NAWC AD Patuxent River. A range of qualified personnel, many of them managers and engineers, would be transferred to the installation as a result of realignment activities and the proposed action. The majority of personnel currently live in the Washington metropolitan area. No significant cumulative impacts are projected. Controlled growth would benefit the area. Working closely with the local community officials would avoid or minimize any negative impacts.

4.9.8 Water Resources

The increase in daily base activities would have an unavoidable, but insignificant impact on water resources. Other than the increased numbers of military personnel in the area affecting the demand for potable water, no actions have been identified that could have a cumulative impact on the resource. Current potable

water supplies in the area are sufficient to serve the increased numbers of personnel associated with the V-22 program and for other projected actions. Wastewater usage would unavoidably increase. The permitted quantity and capacity for disposal of wastewater would not be exceeded for the proposed and other activities, and no significant cumulative impact would occur. Implementation of the stormwater management plan would also assist planners in preventing cumulative impacts to the stormwater program.

4.10 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENTS

Irreversible and irretrievable resource commitments are related to the use of nonrenewable resources and the effects that use of these resources will have on future generations. Irreversible effects primarily result from use or destruction of a specific resource that cannot be replaced within a reasonable time frame. Irretrievable resource commitments involve the loss in value of an affected resource that cannot be restored as a result of the action (e.g., extinction of a threatened or endangered species or the disturbance of a cultural site).

Short-term commitments of labor, capital, and fossil fuels would occur during construction of the ground run stand and VESTL. This construction would involve the permanent use of the construction materials. However, no unusual type or amount of materials would be required. These materials, except recyclable items, would be irretrievably committed.

The land that would be occupied by the ground run stand has previously been disturbed. This land could be restored to its existing condition of open space, and could be revegetated. Therefore, the commitment of land is not necessarily irreversible.

Commitment of materials to the production of the test aircraft would occur offsite. Long-term commitments of resources would occur from operation and maintenance of V-22 facilities, and indirectly from the commitment of water, sewage, electricity, and waste disposal. The amounts of resource consumption are not expected to increase significantly from current usage.

CHAPTER 5
BIBLIOGRAPHY

5 BIBLIOGRAPHY

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CHAPTER 6
LIST OF PREPARERS

6 LIST OF PREPARERS

This environmental assessment has been prepared by the Department of the Navy, Naval Air Warfare Center Aircraft Division, and Program Executive Office, Air ASW, Assault and Special Mission Program (PMA-275), with contractual assistance from LABAT ANDERSON INCORPORATED. The following LABAT ANDERSON INCORPORATED staff members were involved in the preparation of this report:

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APPENDIX A

APPENDIX A
Air Quality Tables

The following tables summarize the results of calculations for mobile and stationary sources of pollutant emissions for the V-22.

Assumptions:

V-22 Operations: Emissions factors were taken from operational emissions estimates for the V-22 F406-AD-400 engine. Calculations were based on five operational aircraft, operating 200 hours per month (of which half are flight hours). The proportion of flight time was based on V-22 test data (Kumpel, 1995) for aircraft #2 and 3; as of 14 July 1995, 595 flights occurred and total operating hours were 1,254 (of which 56 percent (711) were flight hours).

Ground Run Stand Testing: Tests for the rotor aeroelastic whirl and preliminary flight acceptance would be performed at the ground run test stand. the 150-hr preproduction test and the 250-hr ground endurance test would be conducted elsewhere. Military power settings were used as worst case fuel consumption for the calculations.

Construction: The time and equipment values were estimated based on the extent of the construction effort and the area to be disturbed. A factor of 6.5 acres for the ground to be disturbed and a factor of 2,400 tons of dirt to be moved were used. Emission calculations for the equipment used values from the CEQA Air Quality Handbook (CA SCAQMD, 1992).

					V-22 EMISSIONS					
V-22 Operations										
V-22 operations are based on 2400 operational hours (flight and rotor turn) per year, 1.5 hours per operation.										
Emission factors (EmFac) are in pounds										
Operation		Power Setting		%Time	Fuel-lb/hr	Fuel/operation		Ops/year		
Taxi Out		Idle		42	717	155.35				
Takeoff		Military		3	6150	82				
Climbout		Military		3	5668	96.13				
Approach		Approach		10	736	39.25				
Taxi In		Idle		42	717	155.35				
Totals				100	13988	528.08		1600		
	SOx		CO		NOx		VOC		PM10	
Taxi Out	0.06214		4.67759		0.54839		3.46741		3.09768	
Takeoff	0.0328		0.0533		0.8569		0.01312		0.6355	
Climbout	0.03926		0.06379		1.02548		0.0157		0.76053	
Approach	0.0157		0.01649		0.38675		0.00746		0.51555	
Taxi In	0.06214		4.67759		0.54839		3.46741		3.09768	
Totals (lbs)	0.21204		9.48876		3.36591		6.9711		8.10694	
Totals (lbs/day)	0.9294904		41.594564		14.754674		30.558247		35.537271	
Totals (tpy)	0.169632		7.591008		2.692728		5.57688		6.485552	
Fueling										
Hours			2400							
Fuel (lbs per hour)			13988							
Total fuel			33571200							
EmFac (lbs/1000 gal)							0.3			
Totals (lbs/day)	0		0		0		27.592767		0	
Totals (tpy)	0		0		0		5.03568		0	

Ground Run Stand Testing										
Test		Duration (hr/yr)		Power Setting (worst case)			Fuel (lb/hr)	Fuel (total)		
Rotor Whirl		10		Military			6150	61500		
Pre Flight Acc		50		Military			6150	307500		
Preproduction		0		n/a			0	0		
Ground Endurance		0		n/a			0	0		
Rotor Brake		n/a		n/a						
Vibration		n/a		n/a						
Emissions factors (per 1000 lb of fuel (in lbs))										
	SOx		CO		NOx		VOC		PM10	
EmFac	0.3926		0.06379		1.02548		0.0157		0.76053	
Rotor Whirl	24.1449		3.923085		63.06702		0.96555		46.772595	
Pre Flight Acc	120.7245		19.615425		315.3351		4.82775		233.86298	
Preproduction	0		0		0		0		0	
Grnd Endur	0		0		0		0		0	
Rotor Brake										
Vibration										
Totals (lbs/day)	0.3969025		0.0644891		1.0367181		0.0158721		0.7688646	
Totals (tons/yr)	0.0724347		0.0117693		0.1892011		0.0028967		0.1403178	
Fueling										
Hours of test stand run			60							
Fuel per hour			6150							
Total fuel			369000							
EmFac (lbs/1000 gal)							0.3			
Totals (lbs/day)	0		0		0		0.3032877		0	
Totals (tpy)	0		0		0		0.05535		0	

Construction										
Equipment		Use (hr/day)		No. Days		Total Hours				
Scraper		8		10		80				
Wh Loader		8		10		80				
Crane		8		60		480				
Concrete Trucks (3)		8		5		40				
Equipment (VESTL)		Use (hr/day)		No. Days		Total Hours				
Crane		8		6		48				
Dump Truck		8		10		80				
Back Hoe		8		5		40				
Rammer		8		2		16				
Wh Loader		8		10		80				
Concrete Trucks		8		2		16				
Emissions factors (lb/day)										
	SOx		CO		NOx		VOC		PM10	
Scraper	0.46		1.25		3.84		0.27		0.41	
Wh Loader	0.364		1.144		1.9		0.23		0.17	
Crane	0.143		0.675		1.7		0.15		0.14	
Concrete Trucks	0.45		1.8		4.17		0.19		0.26	
Dump Truck	0.45		1.8		4.17		0.19		0.26	
Back Hoe	0.0005		0.57		0.011		0.025		0.0001	
Rammer	0.0005		0.83		0.004		0.043		0.0005	
Calculations	in lbs/job									
Scraper	4.6	0.46	12.5	1.25	38.4	3.84	2.7	0.27	4.1	0.41
Wh. Loader	7.28	0.728	22.88	2.288	38	3.8	4.6	0.46	3.4	0.34
Crane	9.438	0.9438	44.55	4.455	112.2	11.22	9.9	0.99	9.24	0.924
Dump Truck	4.5	0.45	18	1.8	41.7	4.17	1.9	0.19	2.6	0.26
Back Hoe	0.0025	0.00025	2.85	0.285	0.055	0.0055	0.125	0.0125	0.0005	0.00005
Rammer	0.001	0.0001	1.66	0.166	0.008	0.0008	0.086	0.0086	0.001	0.0001
Concrete Trucks	3.15	0.315	12.6	1.26	29.19	2.919	1.33	0.133	1.82	0.182
Totals (lbs/job)	28.9715		115.04		259.553		20.641		21.1615	

Totals (lbs/day)		2.89715		11.504		25.9553		2.0641		2.11615
Totals (tpy)		0.5287299		2.09948		4.7368423		0.3766983		0.3861974
			Emission factor							
6.5	acres (incl. VESTL)		26.4	lbs/acre/day	10	days			17.16	lbs/day
2400	cu yd moved		0.022	lbs/ton	2400	ton			5.28	lbs/day
Calculations										
	SOx		CO		NOx		VOC		PM10	
Total (tpy)[tons/job]	0		0		0		0		0.1122	
Total Construction (dirt moving over a 10 day period)										
	SOx		CO		NOx		VOC		PM10	
Totals (lbs/day)	2.89715		11.504		25.9553		2.0641		24.55615	
Totals (tpy)	0.5287299		2.09948		4.7368423		0.3766983		0.4983974	
Mobile Sources										
Increase in automobiles			325							
Average miles per day			25							
Number of days (2080 hr/8)			260							
Number of miles driven per year			2112500							
Pollutant	SOx		CO		NOx		VOC		PM10	
EmFac (gram/mi)			5.4		0.6		0.058		0.12	
Totals (gr/yr)	0		11407500		1267500		122525		253500	
Totals (lbs/day)	0		68.445		7.605		0.73515		1.521	
Totals (tpy)	0		12.491213		1.3879125		0.1341649		0.2775825	
Total Operations; Test, Mobile, Construction										
	SOx		CO		NOx		VOC		PM10	
Totals (lbs/day)	4.2235429		121.60805		49.351692		61.269423		62.383286	
Totals (tpy)	0.7707966		22.19347		9.0066838		11.18167		7.4018497	

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APPENDIX B

APPENDIX B
Effects on Eagles and Peregrine Falcons

A 12 year study of 2,036 nesting attempts of bald eagles included surveys from light, fixed-wing aircraft flown at low altitudes and slow speeds. At least two checks of each nest were made each breeding season. Incubating eagles paid so little attention to the aircraft that eggs often could not be seen (Sprunt et al. 1973).

A three year nesting-success survey of bald eagles included weekly observations from a Cessna fixed-wing aircraft from March through September 1976 to 1978. Over 700 passes were made over eagles in the incubation posture, and 149 passes over brooding adults. Responses were noted on only two passes, during which the eagles rose from the incubating or brooding posture but did not fly. The survey apparently had no effect on reproductive success (Fraser et al. 1985).

Golden eagles surveyed in winter in Texas and New Mexico were rarely frightened by a Cessna 180 at 100 to 300 feet above ground level. The aircraft had to get extremely low to flush eagles from their perches (Boeker and Bolen 1972). In another study, very low passes by a Super Cub aircraft could not flush nesting golden eagles from their nests (Hickman 1972).

Jet engine and piston engine helicopters were used to survey bald eagles, golden eagles, peregrine falcons, gyrfalcons, and rough-legged hawks nesting on cliffs or hillsides in open terrain in Alaska. General observations of raptor behavior in response to the rotary-winged aircraft were noted. The high frequency whine made by some of the jet engine helicopters seemed to be much less disturbing to nesting raptors than the low frequency noise of the piston-powered aircraft. Birds were least disturbed when the helicopter flew parallel to a cliff at an initial distance of about a half mile out, with gradual approach toward the nest. Birds often continued to feed their young or loaf on a cliff when approached in this manner. Birds surprised suddenly by the presence of a helicopter appearing from over the top of a cliff usually panicked and exhibited frantic escape behavior. Approach from above was not nearly as alarming to the bird, especially when they could see the approach from a considerable distance. Disturbance just before egg laying, during egg laying, and during incubation were more deleterious than disturbance during the nestling stage.

In the southwestern United States, 40 nests of eight species of raptors (mostly prairie and peregrine falcons) nesting in the wild were subjected to 914 low-level jet flights during 1980 and 1981 (DeYoung, 1985). Most nests were exposed to the jets during incubation and nestling phases of the nesting cycle, and some nests were exposed during the courtship and egg-laying phases. All jet flights were within 500 meters of the eyries. Before the study began, it was observed that flights more than 500 meters from the birds consistently failed to elicit significant responses. Responses to the jet flights consisted mostly of momentary alarm,

which included cowering of nestlings in exposed nests, fleeing of large nestlings deeper into cavity nests in response to very close aircraft approaches (e.g., within 100 meters of the eyrie), and occasional fleeing of adults in response to very close approaches. No effect on reproductive success was noted. Also, no behavioral response of adults or nestlings that would have been likely to result in reduced reproductive success was observed. The number of nests that successfully fledged young was not reduced by the aircraft activity, and re-occupancy of eyries during the second year of the study was as high as would have been expected without the aircraft disturbance. It was not known whether the birds that occupied the eyries in 1981 were the same ones that occupied them in the first year of the study (Ellis 1981).

Data on the likely effects of low-level jets on nesting peregrine falcons and other raptors were gathered at aeries in Arizona. Responses to extremely frequent and nearby jet aircraft were often minimal and never associated with reproductive failure. Nesting success and site re-occupancy rates were high for all aeries. The birds observed were noticeably alarmed by the noise stimuli (82-114 dBA), but the negative responses were brief and apparently not productivity limiting (Ellis 1981).

APPENDIX C

MARYLAND DEPARTMENT OF THE ENVIRONMENT
2500 Broening Highway • Baltimore, Maryland 21224
(410) 631-3000

Parris N. Glendening
Governor

Jane Nishida
Secretary Designate

February 23, 1995

Ms. Jill Cicierski
Mail Stop 1
22623 Cedar Point Road
NAWC AD
NAS Patuxent River MD 20670-5304

Dear Ms. Cicierski:

We have recently received two draft environmental assessments prepared by LABAT-ANDERSON Incorporated for the Naval Air Warfare Center Aircraft Division entitled *V-22 Osprey: Engineering and Manufacturing Development Low Rate Initial Production* and *Test and Evaluation of the T-45 Aircraft.*

We are satisfied that the proposed changes to the V-22 Osprey and the T-45 programs will not result in significant amounts of additional air pollutants (i.e. amounts that would result in violations of the NAAQS).

I encourage you to consider how these programs could reduce current annual emissions of criteria pollutants, in particular those pollutants which contribute to the region-wide ozone problem (VOCs and NO_x). In order to address emissions from mobile sources, the Air and Radiation Management Administration (ARMA) encourages the Navy to purchase low emission ground transportation vehicles for NAWC. In addition, ARMA encourages the Navy to provide incentives to employees who carpool or use alternative modes of travel (vanpooling, bicycles). As far as stationary sources are concerned, ARMA encourages the Navy to continue to explore possible ways to prevent pollution from stationary sources, such as state of the art vapor control systems.

United States Department of the Interior

FISH AND WILDLIFE SERVICE

Chesapeake Bay Field Office
177 Admiral Cochrane Drive
Annapolis, MD 21401
April 25, 1995

Ms. Jill Ciciarski, 85/C002R
Mail Stop 1
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NAWC AD
NAS Patuxent River, Maryland 20670-5304

Re: Draft Environmental Assessment
V-22 Osprey EMD/LRIP Phases
Naval Air Warfare Center, Aircraft Div.
St. Mary's County, Maryland

Dear Ms. Ciciarski:

This responds to your January 30, 1995, submission of the Draft Environmental Assessment (EA) for Engineering and Manufacturing Development (EMD) and Low Rate Initial Production (LRIP) of V-22 Osprey aircraft at the Naval Air Warfare Center-Aircraft Division (NAWC-AD), Patuxent River, Maryland. The U.S. Fish and Wildlife Service (Service) has reviewed the information you enclosed and is providing comments in accordance with the Endangered Species Act (87 Stat. 884, as amended; 16 U.S.C. 1531 *et seq.*), the Fish and Wildlife Coordination Act (48 Stat. 401, as amended; 16 U.S.C. 661 *et seq.*), and the Migratory Bird Treaty Act (40 Stat. 755, as amended; 16 U.S.C. 703 *et seq.*).

The EA describes the proposed testing of V-22 Osprey tilt-rotor aircraft at the NAWC-AD facility, and the proposed construction of an aircraft ground run stand within the bounds of the existing airfield. Aircraft testing would involve missions flown within local tower traffic patterns and restricted areas.

ENDANGERED SPECIES

The EA lists the following Federally listed species that are known to exist in southern Maryland, and that could potentially exist at NAWC-AD:

Peregrine falcon	*Falco peregrinus*
Bald eagle	*Haliaeetus leucocephalus*
Northeastern beach tiger beetle	*Cicindela dorsalis dorsalis*
Puritan tiger beetle	*Cicindela puritana*
Dwarf wedge mussel	*Alasmidonta heterodon*

The Service concurs that the above list accurately represents the Federally listed species that could potentially exist at NAWC-AD, based on their habitat

needs and current range. None of these species have been documented at NAWC-AD, except for occasional transient individuals. The EA acknowledges that aircraft testing operations may result in disturbance of several of the above species at off-base locations.

Bald Eagles

Although no bald eagle nests are known to occur at NAWC-AD, numerous nests are located within the restricted air spaces where testing is performed. Helicopters create substantial noise and are known to be a potential source of disturbance to nesting eagles. V-22 aircraft operated in the rotary-wing mode are likely to elicit similar responses by nesting bald eagles. Disturbance could cause nest abandonment by incubating adults, or premature departure from the nest by fledglings. Aerial surveys of nesting eagles are completed annually by the Maryland Department of Natural Resources (DNR) using fixed-wing aircraft. During these surveys, aircraft typically pass within 50 to 100 feet of incubating eagles without causing nest abandonment (Glenn Therres, DNR, personal communication). However, nesting eagles are unlikely to tolerate the approach of a rotary-wing aircraft within 0.25 mile of a nest site.

The EA recommends no operation of V-22 aircraft within 500 feet of active eagle nests from January to June. Eagles in the Chesapeake Bay region typically initiate nesting during December. The period of highest sensitivity to disturbance (December to June) should be reflected in the period of recommended nest avoidance by aircraft. We further recommend that no rotary-wing aircraft be operated within 0.25 mile of active eagle nests.

Puritan and Northeastern Beach Tiger Beetles

Although neither of these species is known to occur at NAWC-AD, the sandy beaches and bluffs of Calvert County support populations of both species. The EA recommends that landing or hovering over the sandy beaches identified in Figure 3.3-1 must be avoided. The Service concurs that this is an appropriate measure to ensure that aircraft operation does not affect either of these species. We recommend that you contact this office in advance if any operations are planned that may affect sandy beach or bluff habitats.

Conclusions

Based on the description of the proposed action provided in the EA, no negative impacts on Federally listed species are anticipated. This determination assumes that our recommendations for modification of the eagle nest protection measures will be implemented. Should project plans change, or should additional information on the distribution of listed or proposed species become available, this determination may be reconsidered.

This response relates only to threatened and endangered species under our jurisdiction. For information on other rare species, including state-listed species, you should contact Ms. Lynn Davidson of the Maryland Natural Heritage Program at (410) 974-2870.

FISH AND WILDLIFE RESOURCES

One of the Service's primary concerns is the protection of wetland habitat. Wetlands are valuable resource areas for a number of reasons. They can improve water quality by filtering out sediments and by absorbing nutrients and pollutants. They provide rich habitat for a variety of fish and wildlife species. Forested wetlands in particular play a major role in stream ecosystem ecology by moderating water temperatures, contributing food matter, controlling upland runoff into streams, and stabilizing stream banks. Both the Federal and the multi-state Chesapeake Bay Program wetlands policies have the interim goal of no overall net loss of the Basin's remaining wetlands, and the long-term goal of increasing the quality and quantity of the Basin's wetlands resource base. Because of these interagency goals and the value of these areas, the Service strongly advocates avoidance of wetland impacts.

The Draft EA provided no discussion of Federal jurisdictional wetlands in the vicinity of the proposed ground run stand. The Service recommends that all wetlands on the site be delineated in accordance with the *Corps of Engineers Wetlands Delineation Manual; Technical Report Y-87-1* ("the 1987 Manual"). The Final EA should identify any jurisdictional wetlands that could be impacted by the proposed construction. If placement of fill in wetlands is proposed, an analysis of alternatives should also be provided, in accordance with the Section 404(b)(1) Guidelines. The alternatives analysis should discuss measures taken to avoid wetland impacts, and design features that minimize unavoidable impacts. In accordance with the multi-agency goals for wetland losses in the Chesapeake Bay watershed, compensatory mitigation should be provided for unavoidable wetland impacts. If construction in wetlands is proposed, you should contact the U.S. Army Corps of Engineers, Baltimore District at (410) 962-3670 for permit requirements.

We appreciate the opportunity to provide information relative to fish and wildlife resources. If you have any questions on these comments, please contact Mark Sherfy of this office at (410) 573-4542.

Sincerely,

John P. Wolflin
Supervisor
Chesapeake Bay Field Office

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION III
841 Chestnut Building
Philadelphia, Pennsylvania 19107-4431

FEB 2 8 1995

Ms. Jill Cicierski, 85/C002R
Mail Stop 1
22623 Cedar Point Road
NAWC AD
NAS Patuxent River, MD 20670-5305

RE: T-45A and V-22 Osprey Aircraft

Dear Ms. Cicierski,

EPA has reviewed the Programmatic Environmental Assessment (PEA) for the above referenced projects. The PEA adequately addresses our concerns on the these project, therefore EPA does not have any comments to offer.

Thank you for this opportunity to review and comment on these projects. Any further correspondence concerning this matter should be directed to Pamela J. Phillips (215/597-6289) of my staff.

Sincerely,

Roy E. Denmark, Jr.
NEPA Review Coordina

MARYLAND HISTORICAL TRUST

Office of Preservation Services

Parris N. Glendening, Governor
Patricia J. Payne, Secretary

February 10, 1995

Ms. Jill Cicierski, 85/C002R
Mail Stop 1
22623 Cedar Point Road
NAWC AD
NAS Patuxent River, MD 20670-5304

Re: Section 106 Review - NAVY
Flight Testing and Evaluation
T-45A and V-22 Osprey Aircraft
St. Mary's County, Maryland

Dear Ms. Cicierski:

Thank you for your recent letter, dated 30 January 1995 and received by the Trust on 2 February 1995, requesting our comments on the above-referenced project. We have reviewed the proposed undertakings to evaluate their effects on historic properties, pursuant to Section 106 of the National Historic Preservation Act of 1966, as amended.

In our opinion, construction of the two flight testing and evaluation projects will have no effect on National Register eligible historic properties, including archeological sites and historic structures.

If you have questions or require further assistance, please call Ms. Lauren Bowlin (for structures) or me (for archeology) at (410) 514-7631. Thank you for your cooperation and assistance.

Sincerely,

Lauren L Bowlin FOR
Elizabeth J. Cole
Administrator, Archeological Services

EJC/LLB/9500142-143
cc: Mr. Kyle Rambo
Mr. Larry Earle
Mr. Niles Jokela (Labat-Anderson, Inc.)
Dr. Julia King
Mrs. Samuel M. Bailey, Jr.
Ms. Nancy Rogers